EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION PATTERN ON UPPER EXTREMITY AND SCAPULA ALONG WITH CONVENTIONAL PHYSIOTHERAPY IN PATIENTS WITH ADHESIVE CAPSULITIS

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EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION PATTERN ON UPPER EXTREMITY AND SCAPULA ALONG WITH CONVENTIONAL PHYSIOTHERAPY IN PATIENTS WITH ADHESIVE CAPSULITIS

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DECLARATION

This work has not previously been accepted in substance for any degree and isn't concurrently submitted in candidature for any degree. This dissertation is being submitted in partial fulfillment of the requirements for the degree of B.Sc. in Physiotherapy.

I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority. I confirm that the electronic copy is identical to the bound copy of the Thesis.

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CONTENTS

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Acronyms

BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralysed
IRB	Institutional Review Board
AC	Adhesive capsulitis
ROM	Range of motion
MWM	Mobilization with movement
PNF	Proprioceptive neuromuscular facilitation
NPRS	Numerical Pain Rating Scale
SPADI	Shoulder pain and disability index
TENS	Transcutaneous electrical nerve stimulation
SPSS	Statistical Package for the Social Service

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Abstract

Background: Adhesive capsulitis is one of the shoulder pathologies which related with pain and active shoulder movements and finally progressive limitation of passive movements. It causes stiffness and pain due to internal and undesirable deformation. Nowadays it's been a common and major problem in our country and where proprioceptive neuromuscular facilitation exercise seems to be an effective treatment. **Objective:** The main objective of the study is to investigate or discover the effectiveness of proprioceptive neuromuscular facilitation pattern of upper extremity and scapula along with conventional physiotherapy for the patients with adhesive capsulitis. **Methodology:** The randomized controlled trial design was used to conduct this study. Total 80 samples were selected conveniently from outpatient treatment service of Musculoskeletal Unit, Physiotherapy Department, Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka and then randomly assigned to experimental and control groups for pretest and posttest data. Structured questionnaire was used to assess the socio-demographic and other information of the participants. Pre-test data was collected before beginning of the treatment. The same procedure was performed to collect post-test data at the end of 4 weeks of intervention. Total treatment sessions were 2 sessions per week for 4 weeks. **Outcome measurement tools:** Numerical pain rating scale (NPRS) was used to measure pain and universal goniometer to measure ROM, Shoulder pain and disability index (SPADI) to measure functional performance. **Analysis of data:** Inferential statistics such as Mann-Whitney U test, and Wilcoxon test was done using SPSS version 25. **Result**: It was found that pain and functional inability had reduced and ROM had improved significantly in both between and within group ($P<.05$) except shoulder abduction ($P = 0.093$). **Conclusion:** Proprioceptive neuromuscular facilitation (PNF) pattern along with conventional physiotherapy has the ability to improve the effects on shoulder than only conventional physiotherapy in patients with adhesive capsulitis. This exercise proved beneficial when combined with conventional physiotherapy to minimize disability level and prevent recurrence, reduction of pain and improvement of range of motion.

Keywords: Adhesive capsulitis, Proprioceptive neuromuscular facilitation (PNF) pattern, Conventional physiotherapy.

CHAPTER – I INTRODUCTION

1.1 Background

The evaluation of the stable scapular state plays a principle role in the pathologies of the shoulder and neck. For this reason, these pathologies are classified as the second and third common causes of musculoskeletal pain (Taspinar et al., 2013). Scapulo-humeral rhythm and muscles control of rotator cuff plays vital role in normal functions of shoulder. Imbalance in the shoulder muscles can occur due to disruption of the scapula-humeral synergistic relationship. Most powerful muscle among the rotator cuff muscles is subscapularis. For stability and movement of shoulder it plays a vital role (Al Dajah, 2014). During full ROM of shoulder, the ability of the muscles of the shoulder cavity to simultaneously perform scapular activity, as well as the brachial position of scapula. Lower part of trapezius muscle weakness creates a negative effect on movement of scapula, increases weakness of shoulder, and probably responsible for the lower part of trapezius muscle to degenerate, which plays an important role in maintaining an exact posture and alignment of the shoulder (Choi & Lee, 2013).

Adhesive capsulitis is one of several diseases associated with pain and active shoulder movements, the progressive limitation of passive movements. The internal and undesirable deformation of the shoulder causes stiffness and pain, and treatment needs to remove physical causes. Freezing of the shoulder is often diagnosed in patients with stiff shoulders (Naviaser & Naviaser, 2011). External disorders are not directly related to the shoulder and include cardiopulmonary disease, cervical spine conditions, stroke, Parkinson's disease, and human fractures. Internal disorders are associated with the soft tissue or structure of the shoulder joints and the deformities of the rotator cuff muscles, inflammation and calcification of biceps tendon and other tendons (Zuckerman & Rocito, 2011). Although it’s typically believed to be a self-limiting condition lasting two to three years, some studies have reported as up to 40% of patients have persistent symptoms and stiffness on the far side three years (Balci et al., 2016). There are three phases of Adhesive capsulitis. Such as 1. Painful stage; 2. Frozen stage and 3. Thawing stage. Stage 1) The painful stage which is described by the gradual onset of diffusing shoulder pain that sometimes lasts up to one to two months; Stage 2) The frozen stage is described by progressive loss of motion that lasts many months to a year or longer. This stage additionally exhibits attenuate capsular volume, which might be envisioned

with magnetic resonance imaging, for differential diagnosis; Stage 3) The thawing stage, the ultimate stage, is characterized by gradual improvement of vary of motion leads to many months to years. Deficits in range of motion may still be unresolved for over three to five years about the onset of Adhesive capsulitis (Dudkiewicz et al., 2004).

About a 3% to 5% incidence rate of the normal population affects annually and even up to 40 out of 100 in persons with polygenic disorder. It greatly affects between forty to sixty years of aged people, with females a lot of ordinarily affected than males (Noten et al., 2016). Adhesive capsulitis primarily affects females between the ages of forty and sixty years old. The explanation is well documented and multiple authors have represented the stages of progression from freezing, through frozen, to thawing over 2-3 years. Formal diagnostic criteria haven't been developed however the ordinarily documented clinical findings include: (1) a painful stiff shoulder for a minimum of four weeks; (2) severe shoulder pain that interferes with daily living activities or works; (3) night pain; (4) painful restriction of each passive and active shoulder vary of motion (ROM) (elevation is less than 100^0 with external rotation is restriction greater than half), and (5) normal imaging appearance. Initial management with either benign neglect, supervised neglect, home stretching exercises, or physiotherapy usually results in smart outcomes; but studies have shown that some residual deficits might stay (Grant et al., 2013). Limitations of shoulder motions principally occur in flexion, abduction, and lateral rotation movements. The contraction of shoulder ligaments decreases the area of the capsule and cause limitation of motions. The Success rate with conservative treatment in AC is 90% (Page & Labbe, 2010).

Treatments advocated for adhesive capsulitis include rehabilitation thanks to the initial conservative measure, anti-inflammatory drugs, intra-articular corticosteroids, capsular distension injections, and surgical interventions in refractory cases. Numerous treatments, yet as mobilization and manipulation techniques, are advocated for the restoration of an unpainful state and traditional use of the upper extremity. Management choices for this condition like manual techniques; high-velocity and low amplitude manipulation; end-range and mid-range mobilization and MWM of the shoulder only and/ or of the girdle (Brantingham et al., 2011). The rehabilitative interventions performed rely on the institution. The optimal use of common physical therapies with frequency and timing of session criteria haven't yet been established (Doner et al., 2013). Even though scapular alterations are assessed in patients with frozen shoulder,

treatment programs were targeted on pain relief and improvement in ROM. Scapular exercises weren't enclosed within the programs despite the fact that the scapula plays many roles in facilitating best shoulder performance (Hindle et al., 2012).

1.2 Rationale

Proprioceptive neuromuscular facilitation is an exercise modality defined to facilitate the responses of the neuromuscular mechanisms by stimulating proprioceptors. Effect mechanisms of PNF techniques are stimulating postural reflexes using gravity force to facilitate muscles, using eccentric contractions for muscle activation and utilizing diagonal movement patterns in activation of bi-articular muscles. Both stabilization and scapular movement are essential for the proper and soft function of higher extremities. However, there is not sufficient research in the literature including upper extremity and scapula PNF patterns in exercise protocol in the upper extremity pathologies particularly AC (Akbas et al., 2015). The main objective of this study is to compare between the effectiveness of the proprioceptive neuromuscular facilitation pattern on upper extremity and scapula with conventional physiotherapy and only conventional physiotherapy in the adhesive capsulitis patients. There have been some research articles published about physiotherapy interventions for Adhesive capsulitis patients, but specific articles on upper extremity and scapular PNF patterns technique is not so focused among them.

The effectiveness of upper extremity and scapular PNF patterns technique in patient with adhesive capsulitis of shoulder joint aim to provide the evidence to prove that is the case. However, the research is essential to improve the knowledge of health professionals, as well as to develop the professional skills. The summary of this study will guide physiotherapists to give evidence-based treatment, which will be beneficial for adhesive capsulitis patient and for developing the field of the physiotherapy profession.

1.3 Aim

The purpose of this study is to explore the effectiveness of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula additional to conventional physical therapy techniques in patients with Adhesive capsulitis.

1.4 Objective

1.4.1 General objective:

To identify the effectiveness of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy in patients with adhesive capsulitis.

1.4.2 Specific objectives:

1. To explore socio-demographic (age, gender, marital status, family type, living area, educational status) characteristics of patients with Adhesive capsulitis.
2. To evaluate severity of pain in patients with Adhesive capsulitis.
3. To measure Improvement of Range of Movement (ROM) for patients with Adhesive capsulitis.
4. To find out the functional performance for patients with Adhesive capsulitis.

1.5 Alternative hypothesis

Upper extremity and scapular proprioceptive neuromuscular facilitation pattern with conventional physiotherapy are more effective than conventional physiotherapy for the treatment of patient with adhesive capsulitis.

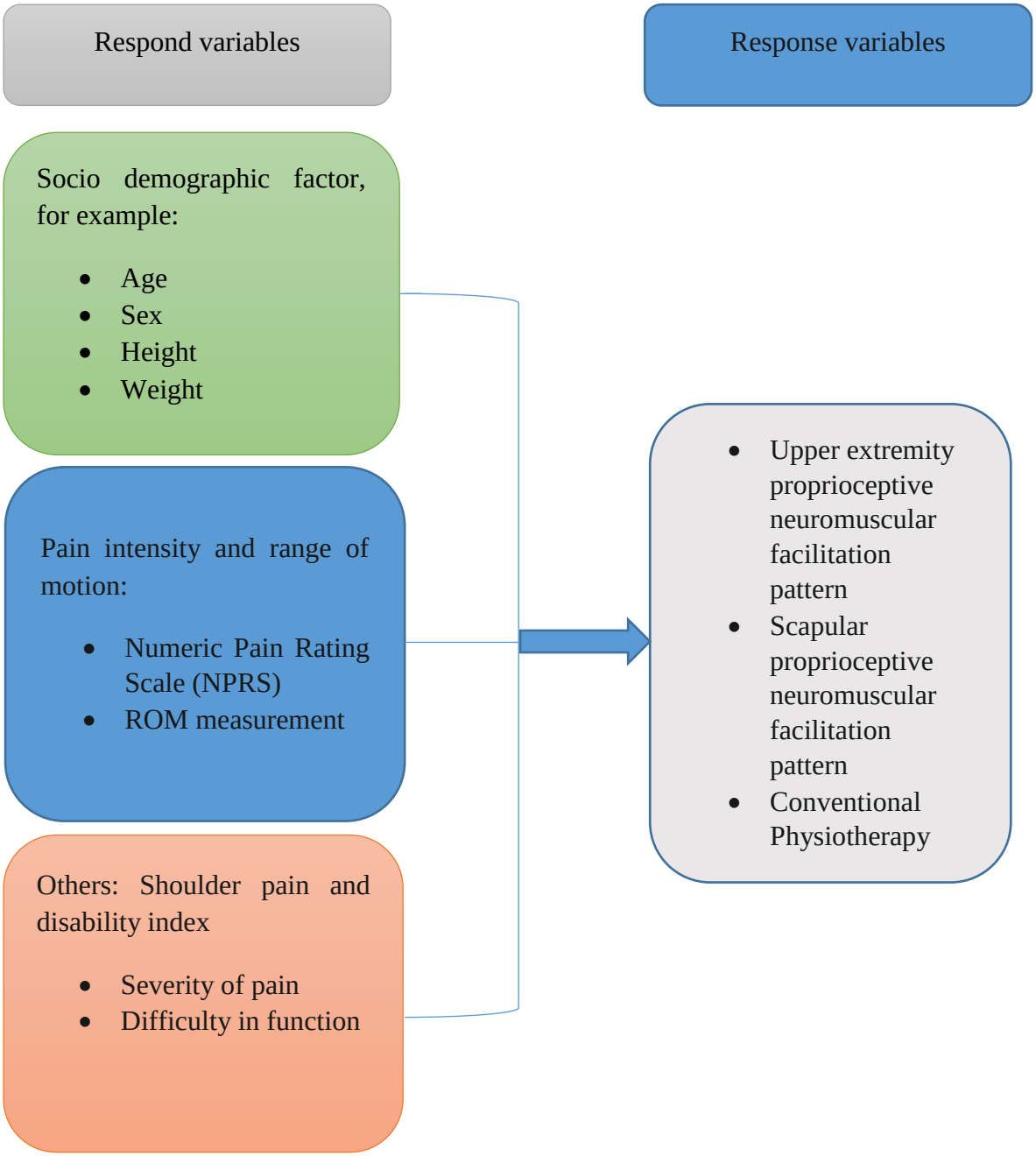
Ha: $\mu 1 - \mu 2 \neq 0$ or $\mu 1 \neq \mu 2$, where the experimental group and control group initial and final mean difference is not same.

1.6 Null hypothesis

Upper extremity and scapular proprioceptive neuromuscular facilitation pattern with conventional physiotherapy are not more effective than conventional physiotherapy alone for the treatment of patient with adhesive capsulitis.

Ho: $\mu 1 - \mu 2 = 0$ or $\mu 1 = \mu 2$, where the experimental group and control group initial and final mean difference is same.

1.7 List of variables



1.8 Operational Definition

1.8.1 Adhesive Capsulitis

Adhesive capsulitis may be a common shoulder condition which is painful and that's related to loss of vary of motion within the glenohumeral joint. It results from contraction of the joint capsule of shoulder and leads to the adhesion of the humeral head. The term ‘frozen shoulder’ unremarkably accustomed describes adhesive capsulitis and alternative conditions related to loss of vary of motion at the joint. though adhesive capsulitis is commonly ending, it will persist for years and will never totally resolve.

1.8.2 Conventional Physiotherapy

Physiotherapy interventions that are widely accepted and commonly practiced by medical community. The researcher formulated a list of evidence based physiotherapy interventions of adhesive capsulitis and provided those to the physiotherapist to mark the interventions commonly used as conventional physiotherapy for Adhesive capsulitis.

1.8.3 Proprioceptive neuromuscular facilitation (PNF)

Proprioceptive fascicle facilitation (PNF) is an exercise modality outlined to facilitate the responses of neuromuscular mechanism by stimulating proprioceptors. Result mechanisms of PNF techniques are stimulating bodily property reflexes victimization gravity force to facilitate muscles, victimization eccentric contractions for muscle activation and utilizing diagonal movement patterns in activation of bi-articular muscles. Both stabilization and movement of bone are essential for applicable and swish perform of higher extremities.

CHAPTER – II LITERATURE REVIEW

Adhesive capsulitis happens at a rate of 2 to 5 percent of the population and a majority of patients are feminine. Ages vary from forty to sixty years, and also the non-dominant hand is often got implicated. About 20 to 30 in the percentage of these affected can develop the condition within the opposite shoulder (Neviaser & Hannafin, 2010). Adhesive capsulitis is typically classified as primary or secondary. Patients are classified as having primary or idiopathic adhesive capsulitis if no findings on history or examination justify the onset of illness. These cases are also involving immunological, biochemical, or secretion imbalances. Secondary adhesive capsulitis develops from familiar causes of stiffness and immobility, like previous shoulder trauma or surgery, and should represent a completely different condition. several conditions and procedures cause the higher extremity to be in a very dependent position for extended time period, however, it's unknown whether or not the development of frozen shoulder in several of those cases is related to pain and immobility (Hsu et al., 2011). Idiopathic adhesive capsulitis, a painful, stiff shoulder of unknown etiology that's additionally noted as a frozen shoulder, has a prevalence 2 out of 100 within the general population. It affects a lot of females than males and is most typical between the age of 35 and 65 years (Le Lievre & Murrell, 2012).

Nowadays there is no definitive test to identify adhesive capsulitis, but it is important to know that some patients who are in the trials probably had other shoulder disorders, that could affect the response to the provided treatment. Despite this, a clinical designation is widely created if patients have painful restriction in more than 2 planes of each active and passive movement of the shoulder, and each effort was created to make sure that, as so much as attainable, the diagnoses of patients enclosed within the trials were as correct as possible (Blanchard et al., 2010). The hallmark of adhesive capsulitis is reduced vary of motion and shoulder pain. There usually isn't any specifiable cause or trigger. The pain is usually represented as a poorly localized, deep ache. If the pain is localized, it's sometimes within the space of the anterior or posterior capsule. The pain may be radiated to the biceps area. Patients might have progressive pain and stiffness once reaching overhead, away, and behind the rear. Weakness is usually concerning pain or concomitant tendinopathy. Crepitus is also present on the concerned aspect. Like several shoulder conditions, pain might impair sleep. unlike a

lot of serious causes of shoulder pain, adhesive capsulitis doesn't cause red flag symptoms similar to fever, night sweats, and unexplained weight loss. Neuropathic symptoms within the forearm and hand recommend another designation, like cervical radiculopathy (Ewald, 2011).

A variety of treatment methods for AC are developed to alleviate pain and enhance the vary of motion (ROM) of the shoulder. The mainstay of those is physiotherapy, with different choices as well as chiropractic manipulation, corticosteroids either through local injection or systemically, manipulation underneath anaesthesia, scalene block, surgical intervention (arthroscopic and open arthrosis), and injection of joint capsule's fluid volume. though various physiotherapy interventions, like heat or ice applications, interferential therapy, TENS, ultrasound, proprioceptive neuromuscular facilitation techniques, active and/or passive ROM exercises, muscle strengthening exercises, and joint mobilization techniques, are used to treat shoulder AC, mobilization techniques, often employed by both physical and manual therapists, are a very important part of the intervention of the many physiotherapy programs (Ma et al., 2013). To regain the conventional extensibility of the capsule of shoulder and soft tissues tightness, passive stretching of the shoulder capsule and soft tissues by suggests that of mobilization techniques has been suggested, however restricted information supporting the utilization of those techniques are accessible. Mobilization techniques improve the conventional extensibility of the shoulder capsule and stretch the tightened soft tissues to induce helpful effects (Goyal et al., 2013). Despite the appliance of various techniques, as well as heat application, ultrasound, interferential therapy, TENS, active and passive vary of motion exercises, stretching exercises, proprioceptive neuromuscular facilitation, and mobilization techniques, argument remains concerning what treatments have best effectiveness. The pathophysiology of those techniques might embrace mechanical breakage of adhesions, collagen realignment, increasing fiber glide, similarly as a neurophysiologic impact based on stimulation of peripheral mechanoreceptors and inhibition of nociceptors. Biomechanical investigations have shown that static progressive stretch devices have the potential to revive joint vary of motion quicker than alternative kinds of rehabilitation devices, like that provided by dynamic splinting (Ibrahim et al., 2012).

Table 1: Summary of physiotherapy intervention for adhesive capsulitis based on published studies (Jason et al., 2015).

Author	Intervention	Control	Duration	Result
Brantingham et al., 2011	Manipulation therapy (Systematic review)	-	Jan. 1983 to July 7, 2010	Fair level of evidence for MMT
Ma et al., 2013	Whole-body cryotherapy	Physical therapy modalities and joint mobilization	4 weeks	Significant improvement in WBC group (Ps <.01).
Ansari & Shah, 2013	Ultrasound with end range mobilization	End range mobilization of shoulder	4 weeks	Significant difference between the two groups to infer the effectiveness of UST and ERM over Cryotherapy
Ibrahim et al., 2014	Static progressive stretch device	Traditional therapy	4 weeks	($P < 0.05$) Significant improvement for SPSD
Mehta et al., 2013	PNF Stretching	Self-stretching	4 weeks	PNF Stretching showed significant improvement in

				ROM and SPADI
Joshi & Jagad, 2013	Stretch Glides	Ultrasound, same exercise protocol	2 weeks	Anterior stretch glide is more effective in improving shoulder external rotation and pain.
Deshmukh et al., 2014	Myofascial release Arm-pull technique	Maitland's mobilization + Exercises	3 weeks	Myofascial release Arm pull technique showed significant results in reducing symptoms as well as improving functional abilities
Shah & Misra, 2013	Maitland Mobilization Technique	Moist pack, active ROM exercises	2 weeks	Significant ROM improvement was seen in Maitland mobilization group and reduction in pain was seen in MET group

Yang et al. 2012	End-range mobilization, mid- range mobilization, and mobilization with movement	Pendulam exercises and scapular setting	12 weeks	Statistically significant improvements were found in ERM and MWM. Additionally, MWM corrected scapula-humeral rhythm significantly.

Proprioceptive Neuromuscular Facilitation (PNF)

PNF could be a treatment construct with four theoretical mechanisms, noted as autogenous inhibition, behavior modification, stress relaxation, and also the gate control theory, that enhance ROM and muscle activation. PNF exercises involving agonist and antagonist muscles are designed to assist the neuromuscular responses of the proprioceptors and are often employed in the clinics to relieve pain and increase ROM for numerous ailments. It is an attractive technique for increasing strength and interception in aged individuals and should have further advantages in addition to increasing ROM. during this study, the future functional effectiveness of PNF was investigated from numerous aspects with special stress on the useful purpose of view (Alaca et al., 2015). Among PNF techniques, the hold-relax technique is often utilized in clinics to alleviate pain, and to extend the vary of motion of joints. The stabilizing reversal technique is employed to reinforce the muscle strength of the postural muscles of the trunk, the shoulder girdle, and also the hip, stabilizing the muscles and increasing the steadiness of the relevant joints. this method is expedited once the opposite changes to the synergism of static muscular activity. Agonist synergy and antagonist synergy occur alternately (Lee et al., 2013). Through PNF treatment the flow of blood increased up to 71% and subjective pain level decreased to 16%. Simple exercise increase blood flow up to 0.7% and decrease subjective pain level to 21%. Advance research shows, statistically there is no significance in either decreasing subjective pain or increasing

flow of blood (Kim et al., 2015). A useful impact of PNF coaching was found to be flexibility (shoulder flexion ROM, ankle joint dorsiflexion) and isometric strength (hip extension, ankle joint flexion and extension). Measures of physical performance (sit-to-stand) additionally improved. Previous reviews declared that the addition of pragmatic manual therapy was effective in reducing pain intensity compared to exercise alone. In 2005, Citkar stated that it had been discovered that mobilization and PNF strategies are each equally effective (Nakra et al., 2013). PNF's purposeful movement patterns are diagonal and spiral, usually crossing the mid-plane of the body. PNF uses these movement patterns as everyday tasks and skills, from learning a bottle of water to throwing and kicking, naturally involve diagonal and spiral movements (Burton & Brigham, 2013).

CHAPTER – III METHODOLOGY

3.1 Study design

The study is designed using a randomized controlled experimental quantitative research. According to DePoy & Gitlin (2013) the design could be shown by:

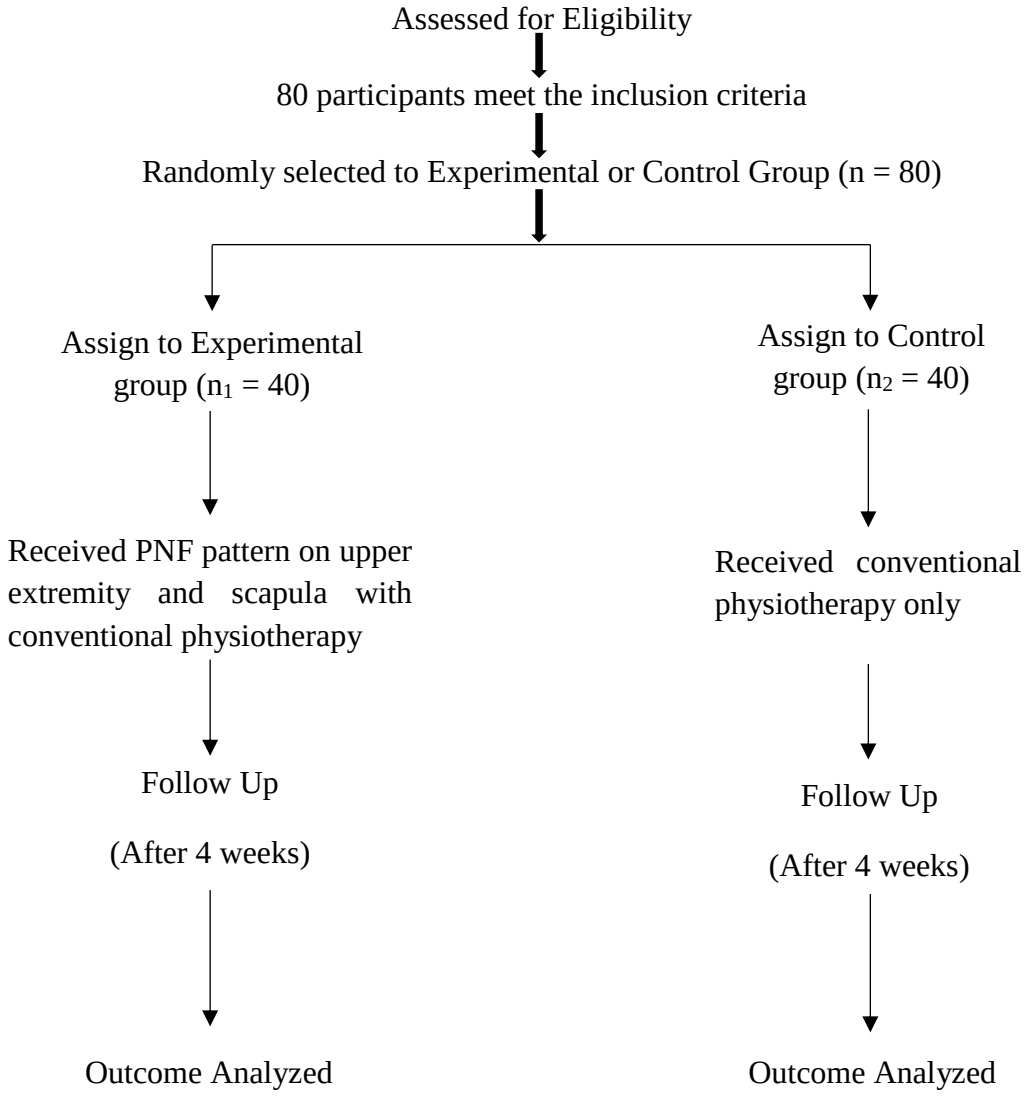
Experimental Group: R O_1 X O_2

Control Group: R O_3 O_4

The study is an experimental between two subject designs. Proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy will be applied to the experimental group and Conventional physiotherapy only will be applied to the control group.

A pre-test (before intervention) and post-test (after intervention) will be administered with each subject of both groups to compare the pain effects, ROM and functional performance before and after the treatment.

Flowchart of the phases of randomized controlled trial



CONSORT flowchart for a randomized controlled trial of a treatment program including Proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy for patients with adhesive capsulitis.

3.2 Study area

Outdoor Physiotherapy Department, Musculoskeletal Unit, Department of Physiotherapy, CRP, Savar, Dhaka- 1343.

3.3 Sample size

Sample size was 80 participants. 40 participants were in experimental group and remaining 40 participants were in control group.

3.4 Study population

A population refers to the entire group of people or items that meet the criteria set by the researcher. The populations of this study will be the adhesive capsulitis patients.

3.5 Sample selection

Computerized Random sampling technique was used in this study. An assessor-blind randomized controlled trial with pre-measurements and post-measurements was conducted. Participants were measured by a blinded assessor once before randomization and intervention and again once 4 weeks after randomization and getting intervention.

Subjects, who met the inclusion criteria, was included as sample in this study. 80 patients with adhesive capsulitis was selected from outdoor musculoskeletal physiotherapy department of CRP, Savar. When the samples were collected, the researcher randomly assigned the participants into experimental and control group. The study was double blinded. Assessor and patient was blind in this study. Randomization and blinding was done to increase the internal validity of the research. because it improves internal validity of experimental research. Then 40 patients with adhesive capsulitis was randomly assigned to experimental group and 40 patients to the control group for this randomized controlled trial study. All participants were divided into two groups and codes were E05, E06, E09, E10, E11, E12, E13, E14, E15, E16, E17, E18, E23, E24, E26, E29, E30, E31, E34, E36, E37, E38, E39, E41, E43, E44, E47, E51, E56, E57, E58, E60, E61, E62, E65, E72, E73, E76, E77, E78 for experimental group and C01, C02, C03, C04, C07, C08, C19, C20, C21, C22, C25, C27, C28, C32, C33, C35, C40, C42, C45, C46, C48, C49, C50, C52, C53, C54, C55, C59, C63, C64, C66, C67, C68, C69, C70, C71, C74, C75, C79, C80 for control group.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

- ✓ Diagnosed as unilateral adhesive capsulitis by a qualified physiotherapist. (Balci et al., 2016)
- ✓ Pain in shoulder joint at least one month (Balci et al., 2016).
- ✓ Age range: 21 – 70 years old (Akbas et al, 2015).
- ✓ Gender: Both male and female (Mahendran & Chetia, 2013).
- ✓ Subjects who are willing to participate in the study (Mahendran & Chetia, 2013).

3.6.2 Exclusion Criteria

- ✓ History of shoulder surgery or manipulation under anesthesia.
- ✓ Neurologic deficits affecting shoulder functioning during daily activities.
- ✓ Pain or disorders of the cervical spine, elbow, wrist, or hand.
- ✓ Other pathological conditions involving the shoulder (rotator cuff tear, tendinitis etc.)

(Balci et al., 2016)

3.7 Method of data collection

3.7.1 Data collection tools

A written questionnaire, pen, paper and a goniometer will be used as data collection tools in this study.

3.7.2 Questionnaire

The questionnaire will be developed under the advice and permission of the supervisor following certain guidelines.

3.8 Measurement tool

3.8.1 Numerical pain rating scale

In this study, the researcher will use Numerical pain rating scale for measuring the intensity of pain. The Numerical pain rating scale is a simple and accurate way of subjectively assessing pain along a continuous visual spectrum. It comprises of a straight line on which the person being assessed marks the level of pain. The ends of the straight line are the extreme limits of pain with 0 representing no pain, 1 - 3 mild pain, 4 - 6 moderate pain and 7 - 10 representing the worst pain ever experienced.

3.8.2 Goniometer

In this study, the researcher will use goniometer for measuring the Range of Movement (ROM) of shoulder Abduction, Lateral rotation and Medial rotation. The Goniometer is a simple and accurate way of objective assessment of ROM.

3.8.3 Shoulder Pain and Disability Index (SPADI)

In this study, the researcher will use the SPADI that could be a self-administered form that consists of 2 divisions, one for pain and also the other for functional activities. The pain dimension consists of 5 queries concerning the severity of a person's pain. functional activities are assessed with eight queries designed to measure the degree of difficulty a person has with numerous daily living activities that need upper-extremity use. The SPADI takes five to ten minutes for a patient to finish and is that the solely reliable and valid region-specific measure for the shoulder (Taha et al., 2013).

3.9 Data collection procedure

The data collection procedure was conducted through assessing the patient, initial recording and final recording. After screening the patient at department, the patients will be assessed by graduate physiotherapist. Eight sessions of treatment will be provided for every subject. After screening the patients at the department, the patients were assessed by a qualified physiotherapist. 4 weeks of treatment was provided for every participant. 80 participants were chosen for data collection according to the inclusion criteria.

Data was gathered through a pre-test, intervention and a post-test and the data was collected by using a structured and close-ended written questionnaire form which had

been formatted by the researcher. Data collection procedure was single blinded. Data was collected by the data collector and intervention was given by the clinical physiotherapist with the supervision of a qualified physiotherapist. Pre-test was performed before beginning the intervention. The same procedure was performed to apply post-test at the end of 4 weeks of treatment. Researcher provided the assessment form to the data collector to collect information from the selected participants before starting treatment and after finishing 4 weeks of intervention. The data collector collected all the data from the group in front of the qualified physiotherapist and verified by a witness selected by the Head of clinical setting in order to reduce the biasness. At the end of the study, for statistical analysis, different tests were carried out to perform statistical analysis.

3.10 Data analysis

In order to ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words, the researcher had to make sense of the results. As the result comes from an experiment in this research, data analysis was done with statistical analysis.

All participants were coded according to group for maintaining participant's confidentiality. All subjects of both experimental and control group scored their pain intensity on Numerical pain rating scale before starting treatment and after completing treatment. Reduction of pain intensity for both groups, improvement of ROM of different movements of shoulder and improvement of functional performance of the participants was the differences between pre-test and post-test score.

Statistical analysis was performed by using descriptive statistics for demographic data and inferential statistics for group differences of Reduction of pain intensity for both groups, improvement of ROM of different movements of shoulder and improvement of functional performance of the participants through Statistical Package for the Social Science (SPSS) version 25.

3.11 Statistical analysis

According to Hicks (2009), "Experimental studies with the different subject design where two groups are used and each tested in two different conditions and the data interval or ratio should be analyzed with unrelated 't' test." The between group analysis of pain intensity, improvement of ROM of different movements of shoulder and improvement of functional performance of the participants was analyzed by Mann-Whitney U-test. The within group analysis of pain intensity, improvement of ROM of different movements of shoulder and improvement of functional performance of the participants was done by Wilcoxon singed rank test.

Parametric test was used to do analyzed interval/ ratio data and non-parametric test used to analyzed the nominal/ordinal data. Also normality of data was checked (Table - 2). Normality of data was tested by Kolmogorov-Smirnov test. As the value of Kolmogorov-Smirnov test is less than .05, which indicate that the data distribution is not normal. The Kolmogorov-Smirnov test was used to determine normal distribution of the SPADI data. The results of this test indicated that the data for SPADI was not normally distributed and hence non-parametric statistics were used for the analysis of data. Within group analysis was done by Wilcoxon signed ranked test and between group analysis was done by Mann-Whitney U test.

Table 2: Normality test of data

Variable	Kolmogorov test	Skewness	Kurtosis
Total SPADI score (Post-test)	0.000	0.069	1.551

Mann-Whitney U test is a non-parametric test that is simply compares the result obtained from each group to see if they differ significantly. This test can only be used with ordinal or interval/ ratio data.

The formula of Mann-Whitney U test:

$$U = n_1 n_2 + \frac{n_x(n+1)}{2} - T_x$$

Here,

n_1 = number of subjects from experimental group.

n_2 = number of subjects from control group.

T_x = the larger rank total.

n_x = the number of the subjects of the group with larger rank total.

Wilcoxon sign-ranked test is used when two groups of matched subjects, one group represent one condition and the other group represent other condition; to see if there is significant deference within the groups.

The formula of Wilcoxon sign-ranked test:

$$Z = \frac{W_S - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

Here,

n = number of pairs where differences is not 0

W_s = smallest of absolute values of the sum

"The statistical approach to determining sample size was the power calculation. Statistical power is a measure of how likely the study was to produce a statistically significant result for a difference between groups of a given magnitude" (Hicks, 2009).

Table 3: Researcher has calculated pre-treatment's value of pain intensity through Mann-Whitney U test in between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Numeric Pain Rating Scale	Severity of pain is at resting position	2.65 ± 0.533	2.75 ± 0.543	4.512	0.000*
	Severity of pain during rising arm sideways	3.80 ± 0.405	3.85 ± 0.362	8.152	0.000*
	Severity of pain during combing hair	3.88 ± 0.404	3.90 ± 0.304	0.037	0.970

Table 4: Researcher has calculated post-treatment's value of pain intensity through Mann-Whitney U test between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Numeric Pain Rating Scale	Severity of pain is at resting position	1.30 ± 0.464	2.10 ± 0.379	4.641	0.000*
	Severity of pain during rising arm sideways	2.08 ± 0.526	3.00 ± 0.226	6.981	0.000*
	Severity of pain during combing hair	2.23 ± 0.480	2.65 ± 0.700	6.860	0.000*

(* p < .0.5, level of significance)

Table 5: Researcher has calculated value of pain intensity through Wilcoxon Signed rank test within experimental group and control group in the following table:

Pain intensity	**Experimental group (n = 40)**		**Control group (n = 40)**	
	Z	**p**	**Z**	**p**
Severity of pain is at resting position	5.747	0.000*	5.099	0.000*
Severity of pain during rising arm sideways	5.623	0.000*	5.831	0.000*
Severity of pain during combing hair	5.734	0.000*	5.243	0.000*

(* p < .0.5, level of significance)

Table 6: Researcher has calculated pre-treatment's value of Range of Motion through Mann-Whitney U test in between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Range of Motion	Passive ROM of Abduction of Affected Shoulder	10.18 ± 2.297	10.05 ± 2.025	0.355	0.723
	Passive ROM of Lateral Rotation of Affected Shoulder	4.33 ± 1.575	4.00 ± 1.155	0.738	0.461
	Passive ROM of Medial Rotation of Affected Shoulder	7.70 ± 2.078	7.35 ± 1.902	0.567	0.571

Table 7: Researcher has calculated post-treatment's value of Range of Motion through Mann-Whitney U test in between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Range of Motion	Passive ROM of Abduction of Affected Shoulder	14.15 ± 1.610	13.45 ± 1.894	1.682	0.093
	Passive ROM of Lateral Rotation of Affected Shoulder	10.15 ± 1.312	7.78 ± 2.270	4.678	0.000*
	Passive ROM of Medial Rotation of Affected Shoulder	13.65 ± 1.189	11.58 ± 2.571	3.728	0.000*

(* $p < .0.5$, level of significance)

Table 8: Researcher has calculated value of Range of Motion through Wilcoxon Signed rank test within experimental group and control group in the following table:

Range of Motion	**Experimental group (n = 40)**		**Control group (n = 40)**	
	Z	**p**	**Z**	**p**
Passive ROM of Abduction of Affected Shoulder	5.580	0.000*	5.556	0.000*
Passive ROM of Lateral Rotation of Affected Shoulder	5.551	0.000*	5.531	0.000*
Passive ROM of Medial Rotation of Affected Shoulder	5.537	0.000*	5.543	0.000*

(* p < .0.5, level of significance)

Table 9: Researcher has calculated pre-treatment's value of Functional performance by Shoulder pain and disability index (SPADI) through Mann-Whitney U test in between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Functional performance by Shoulder pain and disability index (SPADI)	Pain Score	70.75 ± 9.356	73.55 ± 7.067	1.411	0.158
	Disability Score	64.43 ± 6.292	67.43 ± 7.622	2.169	0.030*
	Total Score	66.85 ± 6.616	69.85 ± 7.040	1.884	0.060

(* p < .0.5, level of significance)

Table 10: Researcher has calculated post-treatment's value of Functional performance by Shoulder pain and disability index (SPADI) through Mann-Whitney U test in between experimental and control group in the following table:

		Experimental group (n = 40) X ± SD	**Control group (n = 40) X ± SD**	**Z**	**p**
Functional performance by Shoulder pain and disability index (SPADI)	Pain Score	26.40 ± 5.978	49.40 ± 5.660	7.648	0.000*
	Disability Score	21.85 ± 4.492	43.90 ± 5.638	7.696	0.000*
	Total Score	23.65 ± 4.324	45.98 ± 5.240	7.707	0.000*

(* p < .0.5, level of significance)

Table 11: Researcher has calculated value of Functional performance by Shoulder pain and disability index (SPADI) through Wilcoxon Signed rank test within experimental group and control group in the following table:

Functional performance	**Experimental group (n = 40)**		**Control group (n = 40)**	
	Z	**p**	**Z**	**p**
Pain Score	5.519	0.000*	5.520	0.000*
Disability Score	5.516	0.000*	5.515	0.000*
Total Score	5.517	0.000*	5.515	0.000*

(* p < .0.5, level of significance)

3.12 Level of significance

In order to find out the significance of the study, the researcher calculated the 'p' value. The 'p' value refers the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A 'p' value is called level of significance for an experiment and a 'p' value of <0.05 will be accepted as significant result for health service research. If the 'p' value is equal or smaller than the significant levels, the results are said to be significant.

3.13 Intervention

3.13.1. Experimental group

In this study, the experimental group was treated with PNF pattern on upper extremity and scapula in addition with conventional physiotherapy.

Graduate physiotherapist applied the PNF pattern on upper extremity and scapula and the conventional physiotherapies. Each group would get eight sessions of treatment.

Proprioceptive Neuromuscular Facilitation Technique for Upper extremity:

Patient position: Patent will in supine lying position with the arms beside their body. They will be asked to relax shoulders.

Therapist position: Therapist will stand beside the affected side of the patient.

Technique: "Flexion-abduction-external rotation" (D2F pattern) with elbow straight pattern of PNF with "hold relax" technique. It is a relaxing tool based on isometric contractions against to maximum resistance using for improving passive ROM and decreasing pain. Isometric contractions for 5-8 seconds will be performed against to maximum resistance for not balking antagonist muscles to contract including rotation at limitation point. Technique is repeated a few times at edge limitation point and then, proceeded. While applying D2F pattern with elbow straight pattern of PNF, the therapist will use his hand to hold the patient's upper limb on the opposite side of hip in a posture of shoulder extension/ adduction/internal rotation, elbow extension and forearm pronation. The physiotherapist then asks the patient to raise his hand over head. The patient will attempt to perform this movement, by doing shoulder flexion/abduction/external rotation. During these movements, the therapist will support the patient's arm with his other hand (Figure: 1) (Akbas et al., 2015)

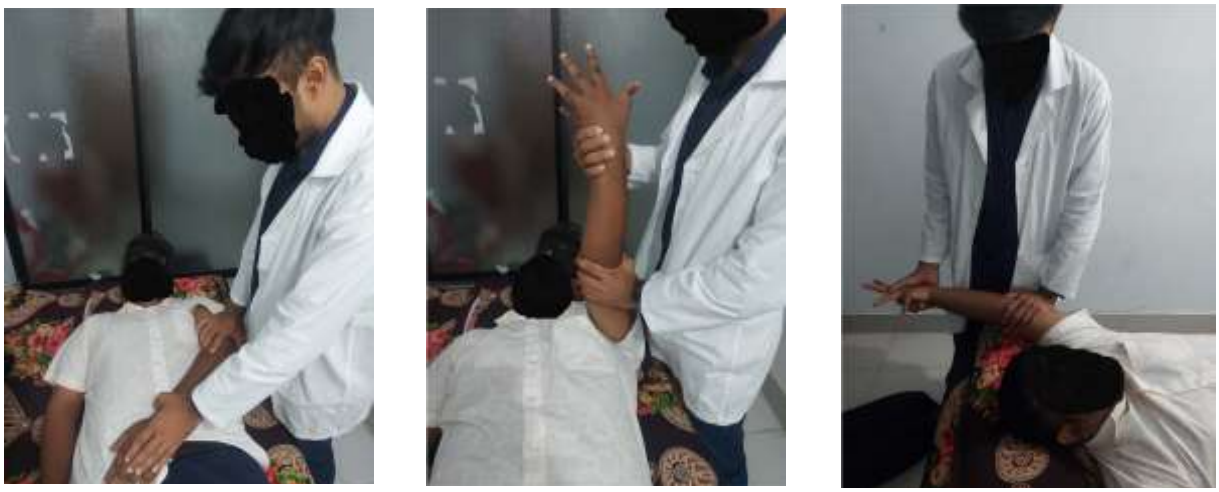


Figure 1: PNF Application to Upper Extremity

Duration of treatment time: 5 to 7 minutes.

Repetitions: 5 repetitions ***Hold time:*** 5 seconds ***Rest time:*** 2 seconds

Treatment session: Total 4 weeks, 2 sessions per weeks.

Proprioceptive Neuromuscular Facilitation Technique for Scapula:

A) Anterior Elevation & Posterior Depression (Figure: 2)

- ***Patient position:*** Patient lie on the unaffected side
- ***Therapist Position:*** Standing behind the patient, placing one hand superior border of scapula and other on inferior angle of scapula
- ***Procedure:*** The patient is instructed to Push up and Push down the scapula against the manual resistance given by therapist.
- ***Repetitions:*** 5 repetitions **Hold time:** 5 seconds
- ***Rest time:*** 2 seconds **Session/Day:** 2 times per weeks

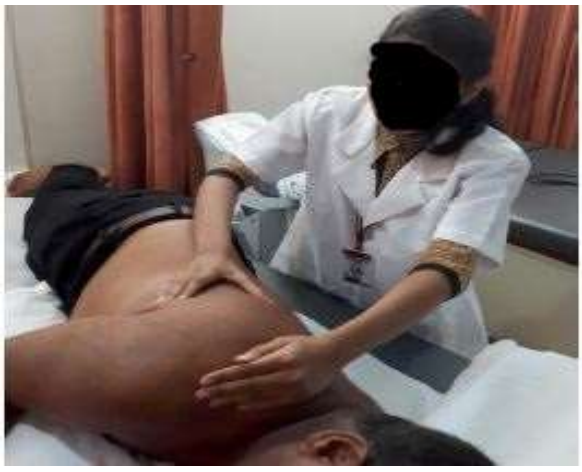


Figure 2: Shows Anterior Elevation and Posterior Depression

B) Posterior Elevation & Anterior Depression (Figure: 3)

- ***Patient position:*** Patient lie on the unaffected side.
- ***Therapist Position:*** Standing behind the patient, placing one hand superior border of scapula and other on inferior angle of scapula
- ***Procedure:*** The patient is instructed to Push back and Push front the scapula against the manual resistance given by therapist.
- ***Repetitions:*** 5 repetitions ***Hold time:*** 5 seconds
- ***Rest time:*** 2 seconds ***Session/Day:*** 2 times per weeks

Figure 3: Shows Posterior Elevation and Anterior Depression

3.13.2 Control group

Control group was given conventional physiotherapy only according to patient's response to treatment. A common intervention program was executed for both groups as conventional physiotherapy, it included –

- Capsular stretching
- Accessory movements
- Pendulum exercise
- Pulley exercise
- Infra-red radiation and
- Ultrasound

3.14 Ethical consideration

Research proposal was submitted for approval to the administrative bodies of ethical committee of BHPI. Again before beginning the data collection, researcher wrote permission letter (Appendix-1) to take the permission from the concerned authorities ensuring the safety of the participants. In order to eliminate ethical claims, the participants set free to receive treatment for other purposes as usual. Each participant was informed about the study before beginning and was given written consent. Again before the beginning of the data collection, the researcher had obtained the permission to use a valid Bengali version of Shoulder Pain and Disability Index as structural questionnaire for collecting data.

3.15 Informed consent

The researcher obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they had the right to meet with outdoor doctor if they think that the treatment was not enough to control the condition or if the condition become worsen. The participants were also informed that they were completely free to decline answering any question during the study and free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study would not affect their treatment in the physiotherapy department and they would still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and could have any questioned answer to their satisfaction.

CHAPTER – IV RESULTS

80 patients with adhesive capsulitis were taken for this study. 40 participants received proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy (experimental group) and another 40 received conventional physiotherapy only (control group). All participants of both experimental and control group scored their Pain effects on Numeric Pain Scale, Range of Motion by Goniometer and Functional performance by using Shoulder Pain and Disability Index (SPADI) before and after completing treatment. The characteristics of participants in each group were described details in Table -11 and Table -12.

4.1 Demographic Characteristics

The study was conducted on 80 participants of adhesive capsulitis patients. Out of the participants the mean age of the participants was 50.80 ± 12.03 years at experimental group and 50.50 ± 11.67 years at control group. Also 60% participants' age was ≥50 years in experimental group where in control group, 62.5% participants' age was ≥50. Most of the participants were married (95% n = 38) and unmarried (about 5% n = 2) in experimental group when in control group married (92.5% n = 9), widowed (5% n = 2) and unmarried (2.5% n = 1). In experimental group, most of them (27.5% n = 11) completed primary education and SSC while in control group, most of them are completed only primary education (35% n = 14). The most common occupation was business (20% n = 8) among men and housewife (37.5% n = 15) among women in experimental group and in control group common occupation was also business (17.5% n = 7) among men and housewife (47.5% n = 19) among women. Most of them were from the urban area in both group, in experimental group it was 75% (n = 30) and in control group it was 82.5% (n = 33).

4.2. Clinical Characteristics

Most the participant's major working position was sitting which was 65% (n = 26) in control group and 67.5% (n = 27) in experimental group. Most of them has trauma history in which 55% (n = 22) had over use trauma in both experimental and control group. Most of the participants had hypertension 40% (n = 16) and both diabetes and hypertension 30% (n = 12) in experimental group while in control group hypertension was 32.5% (n = 13) and both diabetes and hypertension was 22.5% (n = 9). In experimental group, 47.5% (n = 19) only took painkiller as treatment while 37.5% (n = 15) in control group. In case of pain effects, in the experimental group mean score of severity of pain is at resting position (Pre-test) was 2.65 ± 0.53 and severity of pain is at resting position (Post-test) was 1.50 ± 0.51; mean score of severity of pain during rising arm sideways (Pre-test) was 3.80 ± 0.41 and severity of pain during rising arm sideways (Post-test) was 2.20 ± 0.41; mean score of severity of pain during combing hair (Pre-test) was 3.88 ± 0.40 and severity of pain during combing hair (Post-test) was 2.23 ± 0.48 and in control group mean score of severity of pain is at resting position (Pre-test) was 2.75 ± 0.54 and severity of pain is at resting position (Post-test) was 2.10 ± 0.37; mean score of severity of pain during rising arm sideways (Pre-test) was 3.85 ± 0.36 and severity of pain during rising arm sideways (Post-test) was 3.00 ± 0.23; mean score of severity of pain during combing hair (Pre-test) was 3.90 ± 0.30 and severity of pain during combing hair (Post-test) was 3.00 ± 0.00. In case of range of motion, in the experimental group mean score of passive ROM of Abduction of Affected Shoulder (Pre-test) was 10.18 ± 2.29 and passive ROM of Abduction of Affected Shoulder (Post-test) was 14.15 ± 1.61; mean score of passive ROM of Lateral Rotation of Affected Shoulder (Pre-test) was 4.33 ± 1.57 and passive ROM of Lateral Rotation of Affected Shoulder (Post-test) was 10.15 ± 1.31; mean score of passive ROM of Medial Rotation of Affected Shoulder (Pre-test) was 7.70 ± 2.07 and passive ROM of Medial Rotation of Affected Shoulder (Post-test) was 13.65 ± 1.18 and in control group mean score of passive ROM of Abduction of Affected Shoulder (Pre-test) was 10.05 ± 2.02 and passive ROM of Abduction of Affected Shoulder (Post-test) was 13.45 ± 1.89; mean score of passive ROM of Lateral Rotation of Affected Shoulder (Pre-test) was 4.00 ± 1.15 and passive ROM of Lateral Rotation of Affected Shoulder (Post-test) was 7.78 ± 2.27; mean score of passive ROM of Medial Rotation of Affected Shoulder (Pre-test) was 7.35 ± 1.90 and passive ROM of Medial Rotation of Affected Shoulder (Post-test)

was 11.58 ± 2.57. In case of functional performance, in the experimental group mean of total pain score (Pre-test) was 70.75 ± 9.35 and total pain score (Post-test) was 26.40 ± 5.97; mean of total disability score (Pre-test) was 64.43 ± 6.29 and total disability score (Post-test) was 21.85 ± 4.49; mean of total SPADI score (Pre-test) was 66.85 ± 6.61 and total SPADI score (Post-test) was 23.65 ± 4.32 and in control group mean of total pain score (Pre-test) was 73.55 ± 7.06 and total pain score (Post-test) was 49.40 ± 5.66; mean of total disability score (Pre-test) was 67.43 ± 7.62 and total disability score (Post-test) was 43.90 ± 5.63; mean of total SPADI score (Pre-test) was 69.85 ± 7.04 and total SPADI score (Post-test) was 45.98 ± 5.24.

Table 12: Distribution of the respondents by socio-demographic characteristics

		Experimental Group		Control Group	
		Mean (SD)	**Median (IQR)**	**Mean (SD)**	**Median (IQR)**
Age		50.80 ± 12.03	50 (43.25–60)	50.50 ± 11.67	50 (45 – 57)
		% (n)		**% (n)**	
Gender	Male	50 (20)		50 (20)	
	Female	50 (20)		50 (20)	
Marital Status	Married	95 (38)		92.5 (37)	
	Unmarried	5 (2)		2.5 (1)	
	Widow	0 (0)		5 (2)	
Education	Illiterate	7.5 (3)		2.5 (1)	
	Primary	27.5 (11)		35 (14)	
	SSC	27.5 (11)		22.5 (9)	
	HSC	15 (6)		22.5 (9)	
	Graduation	15 (6)		7.5 (3)	
	Masters	7.5 (3)		10 (4)	
Occupation	Farmer	5 (2)		2.5 (1)	
	Government service holder	7.5 (3)		7.5 (3)	
	Non-government service holder	15 (6)		12.5 (5)	
	Businessman	20 (8)		17.5 (7)	
	Garments worker	5 (2)		2.5 (1)	
	Housewife	37.5 (15)		47.5 (19)	
	Teacher	2.5 (1)		2.5 (1)	
	Retired	5 (2)		7.5 (3)	
	Unemployment	2.5 (1)		0 (0)	
Living area	Rural	7.5 (3)		2.5 (1)	
	Urban	75 (30)		82.5 (33)	
	Semi-urban	17.5 (7)		15 (6)	

Table 13: Distribution of the respondents by clinical characteristics

		Experimental group (n = 40) % (n)	Control group (n = 40) % (n)
Major working position	Sitting	67.5 (27)	65 (26)
	Standing	20 (8)	22.5 (9)
	Walking	2.5 (1)	2.5 (1)
	Sitting & Standing	10 (4)	7.5 (3)
	Sitting, Standing & Traveling	0 (0)	2.5 (1)
History of trauma	Yes	85 (34)	90 (36)
	No	15 (6)	10 (4)
If history of trauma present, then	Direct trauma	25 (10)	32.5 (13)
	Over use trauma	55 (22)	55 (22)
	Psychological trauma	5 (2)	2.5 (1)
Any chronic illness	Diabetic Mellitus	12.5 (5)	12.5 (5)
	Hypertension (HTN)	40 (16)	32.5 (13)
	Asthma	2.5 (1)	0 (0)
	Heart disease	0 (0)	2.5 (1)
	Hypertension & Obesity	2.5 (1)	2.5 (1)
	Diabetic Mellitus & Hypertension	30 (12)	22.5 (9)
	Diabetic Mellitus & Heart disease	0 (0)	5 (2)
	Hypertension & Heart disease	2.5 (1)	10 (4)
	Hypertension & Asthma	0 (0)	2.5 (1)
	No illness	10 (4)	10 (4)
Type of treatments tried	Pain killer	47.5 (19)	37.5 (15)
	Physiotherapy	0 (0)	5 (2)
	Traditional medicine	15 (6)	7.5 (3)
	Pain killer & Traditional medicine	5 (2)	7.5 (3)
	Pain killer & Medical treatment	5 (2)	5 (2)
	Pain killer & Physiotherapy	17.5 (7)	7.5 (3)
	Physiotherapy & Traditional medicine	2.5 (1)	2.5 (1)
	Physiotherapy & Medical treatment	0 (0)	2.5 (1)
	Pain killer, Physiotherapy & Traditional medicine	2.5 (1)	5 (2)
	Pain killer, Physiotherapy & Medical treatment	0 (0)	15 (6)
	Pain killer, Physiotherapy, Medical treatment & Traditional medicine	5 (2)	5 (2)

Table 14: IQR of post-test changes in pain effects, range of motion and functional performance between experimental and control group

Table 14 showed IQR of post-test changes of pain effects, range of motion and disability status between experimental and control group. In experimental group, About pain effects, 50% patients have no pain and same have mild pain in resting position; 80% have mild pain during rising arm sideways and 72.5% have mild pain during combing hair; About range of motion, 62.5% patients have increased Passive ROM of Abduction of Affected Shoulder from 131^0 to 160^0, 65% have increased Passive ROM of Lateral Rotation of Affected Shoulder from 46^0 to 65^0 and 52.5% have increased Passive ROM of Medial Rotation of Affected Shoulder from 66^0 to 80^0; About functional performance, 57.5% patients have mild pain in their worse stage of pain, 92.5% have mild pain while lying on the involved side, 85% have mild pain during reaching for something on a high shelf, 80% have mild pain during touching the back of the neck, 90% have mild pain during pushing something with involved arm, 85% have mild difficulty while washing own hair, 55% have moderate difficulty while washing own back, 85% have mild difficulty while putting on an undershirt or jumper, 65% have no difficulty while putting on a shirt that buttons down the front, 72.5% have mild difficulty while putting on own pants, 92.5% have mild difficulty while placing an object on a high shelf & carrying a heavy object of 10 pounds (4.5 kilograms) and 90% have mild difficulty while removing something from the back pocket of own pant. Now in control group, About pain effects, 85% patients have mild pain in resting position, 95% have moderate pain during rising arm sideways and 52.5% have moderate pain during combing hair; About range of motion, 45% patients have increased Passive ROM of Abduction of Affected Shoulder from 131^0 to 160^0, 27.5% have increased Passive ROM of Lateral Rotation of Affected Shoulder from 46^0 to 60^0 and 27.5% have increased Passive ROM of Medial Rotation of Affected Shoulder from 66^0 to 80^0; About functional performance, 95% patients have moderate pain in their worse stage of pain, 77.5% have moderate pain while lying on the involved side, 92.5% have moderate pain during reaching for something on a high shelf and touching the back of the neck, 80% have moderate pain during pushing something with involved arm, 87.5% have moderate difficulty while washing own hair, 92.5% have moderate difficulty while washing own back, 57.5% have moderate difficulty while putting on an undershirt or jumper, 80% have mild difficulty while putting on a shirt that buttons

down the front, 55% have moderate difficulty while putting on own pants, 92.5% have moderate difficulty while placing an object on a high shelf, 85% have moderate difficulty while carrying a heavy object of 10 pounds (4.5 kilograms) and 90% have moderate difficulty while removing something from the back pocket of own pant.

		Median (IQR) of Post-test		**Median (IQR) of Post-test**
Pain effects				
Severity of pain is at resting position	**Experimental group**	1 (1 to 2)	**Control group**	2 (2 to 2)
Severity of pain during rising arm sideways		2 (2 to 2)		3 (3 to 3)
Severity of pain during combing hair		2 (2 to 2.75)		3 (2 to 3)
Range of motion				
Passive ROM of Abduction of Affected Shoulder	**Experimental group**	14 (13 to 16)	**Control group**	13 (13 to 15)
Passive ROM of Lateral Rotation of Affected Shoulder		10 (9 to 11)		7.50 (6 to 10)
Passive ROM of Medial Rotation of Affected Shoulder		14 (13 to 14.75)		12.50 (9.25 to 14)
Functional performance				
Total Pain Score	**Experimental group**	26 (22 to 30)	**Control group**	50 (46 to 54)
Total Disability Score		22 (18 to 25)		44.50 (41 to 48)
Total SPADI Score		23 (20 to 27)		46.50 (43 to 49)

4.3 Pain effects after completing treatment sessions was measured by Numeric Pain Rating Scale (Mann-Whitney U test) between experimental and control group

4.3.1 Severity of pain at resting position

This study found that for pain at its worse, Mann-Whitney U test in between group gives Z = 4.641 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy. (Billiet, 2003)

4.3.2 Severity of pain during rising arm sideways

This study found that for pain at its worse, Mann-Whitney U test in between group gives Z = 6.981 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.3.3 Severity of pain during combing hair

This study found that for pain at its worse, Mann-Whitney U test in between group gives Z = 6.860 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.4 Range of Motion after completing treatment sessions was measured by Goniometer (Mann-Whitney U test) between experimental and control group

4.4.1 Passive ROM of Abduction of Affected Shoulder

This study found that for passive abduction of affected side, Mann-Whitney U test in between group gives Z = 1.682 which is less than critical value of 1.96 and p value 0.093 which is greater than 0.05. So, the null hypothesis is accepted and alternative hypothesis is rejected which means there is no difference between proprioceptive neuromuscular facilitation pattern on upper extremity & scapula and conventional physiotherapy.

4.4.2 Passive ROM of Lateral rotation of Affected Shoulder

This study found that for passive lateral rotation of affected side, Mann-Whitney U test in between group gives Z = 4.678 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.4.2 Passive ROM of Medial rotation of Affected Shoulder

This study found that for passive medial rotation of affected side, Mann-Whitney U test in between group gives Z = 3.728 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.5 Functional performance after completing treatment sessions was measured by Shoulder Pain and Disability Index (Mann-Whitney U test) between experimental and control group

4.5.1 Pain Score

This study found that for total pain score, Mann-Whitney U test in between group gives Z = 7.648 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.5.2 Disability Score

This study found that for total disability score, Mann-Whitney U test in between group gives Z = 7.696 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.5.3 Total SPADI Score

This study found that for total SPADI score, Mann-Whitney U test in between group gives Z = 7.707 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula is more effective than conventional physiotherapy.

4.6 Pain effects that was measured by Numeric Pain Rating Scale (Wilcoxon Signed rank test) within experimental and control group

4.6.1 Severity of pain is at resting position

This study found that in experimental group, 70% (n = 28) participants had no pain and 30% (n = 12) had mild pain after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.747 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in severity of pain is at resting position. And in case of control group, 85% (n = 34) participants had mild pain, 12.5% (n = 5) had moderate pain and 2.5% (n = 1) had no pain after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.099 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in severity of pain at resting position among patients with adhesive capsulitis.

4.6.2 Severity of pain during rising arm sideways

This study found that in experimental group, 12.5% (n = 5) participants had no pain, 70% (n = 28) had mild pain and 17.5% (n = 7) had moderate pain after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.623 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in severity of pain at rising arm sideways. And in case of control group, 95% (n = 38) participants had

moderate pain and 2.5% (n = 1) each had mild and severe pain after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.831 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in severity of pain at rising arm sideways among patients with adhesive capsulitis.

4.6.3 Severity of pain during combing hair

This study found that in experimental group, 72.5% (n = 29) participants had mild pain, 25% (n = 10) had moderate pain and 2.5% (n = 1) had no pain after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.734 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in severity of pain during combing hair. And in case of control group, 55% (n = 22) participants had moderate pain, 32.5% (n = 13) had mild pain, 7.5% (n = 3) had severe pain and 5% (n = 2) had no pain after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.243 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in severity of pain during combing hair among patients with adhesive capsulitis.

4.7 Range of Motion that was measured by Goniometer (Wilcoxon Signed rank test) within experimental and control group

4.7.1 Passive ROM of Abduction of Affected Shoulder

This study found that in experimental group, 62.5% (n = 25) participants have increased Passive ROM of Abduction of Affected Shoulder from 131^0 to 160^0 after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.580 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in Passive ROM of Abduction of Affected Shoulder. And in case of control group, 45% (n = 18) participants have increased Passive ROM of Abduction of Affected Shoulder from 131^0 to 160^0 after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.556 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in Passive ROM of Abduction of Affected Shoulder among patients with adhesive capsulitis.

4.7.2 Passive ROM of Lateral Rotation of Affected Shoulder

This study found that in experimental group, 65% (n = 26) participants have increased Passive ROM of Lateral Rotation of Affected Shoulder from 46^0 to 65^0 after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.551 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in Passive ROM of Lateral Rotation of Affected Shoulder. And in case of control group, 27.5% (n = 11)

participants have increased Passive ROM of Abduction of Affected Shoulder from 46^0 to 60^0 after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.531 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in Passive ROM of Lateral Rotation of Affected Shoulder among patients with adhesive capsulitis.

4.7.3 Passive ROM of Medial Rotation of Affected Shoulder

This study found that in experimental group, 52.5% (n = 21) participants have increased Passive ROM of Medial Rotation of Affected Shoulder from 66^0 to 80^0 after application of proprioceptive neuromuscular facilitation pattern on upper extremity & scapula along with conventional Physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.537 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in Passive ROM of Medial Rotation of Affected Shoulder. And in case of control group, 27.5% (n = 11) participants have increased Passive ROM of Abduction of Affected Shoulder from 66^0 to 80^0 after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.543 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in Passive ROM of Medial Rotation of Affected Shoulder among patients with adhesive capsulitis.

4.8 Functional performance that was measured by Shoulder Pain and Disability Index (Wilcoxon Signed rank test) within experimental and control group

4.8.1 Pain Score

This study found that in experimental group, by examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.519 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in pain status of SPADI. And in case of control group, by examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.520 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in pain status of SPADI among patients with adhesive capsulitis.

4.8.2 Disability Score

This study found that in experimental group, by examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.516 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in disability status of SPADI. And in case of control group, 77.5% (n = 31) participants had moderate pain, 22.5% (n = 9) had mild pain after conventional physiotherapy. By examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.515 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change disability status of SPADI among patients with adhesive capsulitis.

4.8.3 Total SPADI Score

This study found that in experimental group, by examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.517 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means proprioceptive neuromuscular facilitation pattern on upper extremity & scapula showed statistically significant change in pain at reaching for something on a high shelf. And in case of control group, by examining the final test statistics through Wilcoxon signed- ranked test, it was discovered that for n = 40 Wilcoxon table gives Z = 5.515 which is greater than critical value of 1.96 and p value 0.000 which is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted at 5% level of significance which means conventional physiotherapy showed statistically significant change in pain at reaching for something on a high shelf among patients with adhesive capsulitis.

Table 15: Patients perception about pain effects, range of motion and functional performance in Pretest and Posttest score between both groups

Table 15 showed mean differences of disability status according to participants' perception between experimental and control group. Also each category showed higher mean difference in experimental group than control group.

	Experimental Group			Control Group		
	Mean of Pre-test	**Mean of Post-test**	**Mean Difference**	**Mean of Pre-test**	**Mean of Post-test**	**Mean Difference**
Pain Effects						
Severity of pain is at resting position	2.20	2.65	0.45	2.75	2.10	0.65
Severity of pain during rising arm sideways	1.50	3.80	2.30	3.85	3.00	0.85
Severity of pain during combing hair	3.88	2.23	1.65	3.90	3.00	0.90
Range of Motion						
Passive ROM of Abduction of Affected Shoulder	10.18	14.15	3.97	10.05	13.45	3.40
Passive ROM of Lateral Rotation of Affected Shoulder	4.33	10.15	5.82	4.00	7.78	3.78
Passive ROM of Medial Rotation of Affected Shoulder	7.70	13.65	5.95	7.35	11.58	4.23
Functional performance						
Total Pain Score	70.75	26.40	44.35	73.55	49.40	24.15
Total Disability score	64.43	21.85	42.58	67.43	43.90	23.53
Total SPADI Score	66.85	23.65	43.20	69.85	45.98	23.87

Association of Total SPADI score with age of the participants:

Among the 80 participants 8.8% (n=7) was between 20 to 30 years and their mean score was 25.14 ± 4.53 rest of 7.5% (n=6) who was between 31 to 40 years, 37.5% (n=30) was between 41 to 50 years, 26.3% (n=21) who was between 51 to 60 years and 20.0% (n=16) who was between 61 to 70 years old and their mean score accordingly was 38.83 ± 2.86, 46.93 ± 3.12, 56.10 ± 3.21 and 66.06 ± 2.44. In association test using Chi-square, the value was 103.17 which indicates among variables was not significant because p-was 0.797 ($p > 0.05$). So, age of the participants is not significantly related to the total pain and disability score. In case of coefficient variation (CV), between 20 – 30 years is showing greater variation in SD which is also statistically proved. That means 20 – 30 years aged participants are greater in variation.

Table 16: Total Shoulder pain and disability index score according to age of participants

Age of participants	Percentage	Mean ± SD	Chi Square	P Value	CV
20 – 30 years	8.8%	25.14 ± 4.53			18.02
31 – 40 years	7.5%	38.83 ± 2.86			7.37
41 – 50 years	37.5%	46.93 ± 3.12	103.17	0.797	6.65
51 – 60 years	26.3%	56.10 ± 3.21			5.72
61 – 70 years	20.0%	66.06 ± 2.44			3.69

CHAPTER – V DISCUSSION

This study was carried out to determine the effect of PNF in adhesive capsulitis. In consideration, it was revealed that the mean age of the participants was 50.65 ± 11.78 years and among men 21.3% were government and non-government service holder and among women 42.5% were housewife. As for major working position, 66.3% worked in sitting position and 21.3% worked in standing position. Among the participants 55% had history of over use injury. These incidences are indicating the relationship among age, working characteristics and adhesive capsulitis. A randomized controlled study conducted on 36 participants by Akbas et al. (2015) revealed that the mean age of the participants was 53.94 ± 9.38 and only 11 of 36 patients (30.6%) with adhesive capsulitis were still working in various jobs and sectors actively, rest of them weren't working (15 retired -10 unemployed) (69.4%).

This study found that scapular PNF exercises along with conventional physiotherapy were effective for reducing pain intensity while in resting position, raising arm sideways and during combing hair; this study also pointed out that, range of shoulder motion improved more in the PNF group than the control group. But, this difference was not significant for abduction movements, though was significant for external and internal rotation movements and also found significant improvements in functional performance like in pain & disability status. A randomized controlled study by Mishra et al (2019) among 30 participants found that between group analysis of both the groups (scapular proprioceptive neuromuscular facilitation and conventional physiotherapy) shows significant improvement, but mean value of group A shows more reduction in pain and disability compared to group B.

It was disclosed that, upper extremity and scapula PNF patterns provide additional benefit to conventional physiotherapy applications in only abduction movement of shoulder, although do not provide benefit in resting pain, pain in activity like raising arm sideways or combing hair, internal and external rotation movement parameters in management of adhesive capsulitis. Within group analysis of experimental group significant reduction of pain at a significant level of $p<0.000$. The hidden thought behind this could be PNF has been proven to produce analgesic effect through gate control mechanism. PNF technique produces pressure and proprioceptive inputs which

makes to the spinal level and they inhibit the entry and transmission of pain signals (Hindle et al., 2012).

In this study there is significant improvement of shoulder movement specially in internal rotation and external rotation are found in the post interventional increase of Range of motion in PNF group. This can be occurred due to increment in the excitability and decrease in response time. Lee et al (2013) stated in their randomized study that about 32 participants where in PNF with general physiotherapy techniques (a hot pack for 20 minutes, US therapy for 5 minutes, and TENS for 20 minutes) turned into effective for enhancing pain and feature within side the myofascial pain syndrome. They carried out the hold-relax PNF approach to relax the upper trapezius muscle and stabilize reversal PNF techniques for scapula muscles. Although a single session of scapular PNF has been found effective behind the improvement of shoulder Range of motion in flexion and abduction (Hawker et al., 2011).

From this current study, the principle of the PNF pattern was hold-relax technique in which patient was told to hold a certain position for a specific amount of time in both upper extremity and scapular pattern followed by a relaxation period. Joshi and Chitra (2017) told that the technique administered in their study were rhythmic initiation and repeated contraction of anterior elevation and posterior depression of the scapula. They also explained that the firing of the Golgi tendon organ which causes reflexive muscle relaxation also responsible for increase of Range of motion.

Another thing that attributes for improving shoulder function is that proprioceptive neuromuscular facilitation technique is targeted at relaxing tense muscles surrounding the shoulder and restricted joints to make quick gains in Range of motion. A randomized controlled study on 53 participants by Balci et al (2016) concluded that the rhythmic initiation technique applied in scapular PNF teaches the motion, helps the patient to relax, improves coordination, and normalizes the motion. The repeated contractions facilitation technique increases active range of motion and strength and guides the patient’s motion towards the desired motion. Thus, the current study validates the use of PNF technique in improving quality of life and recovery from adhesive capsulitis.

However, these improvements were not directly caused by scapular PNF exercises. The researcher believe that PNF may be effective when performed with a regular rehabilitation program over a long term. Lim et al. (2002) investigated the outcomes of scapular pattern and hold-relax approach of PNF on ROM and pain in 30 sufferers with AC. They dealt with the sufferers for four weeks and discovered that PNF became effective for enhancing ROM and pain.

In general, those research confirmed better outcomes concerning the purposeful outcome, strength, and patient pleasure while a scapular technique is applied in the treatment protocol. If scapular stiffness is assessed after long time treatment, the consequences would possibly differ, because research have proven that shoulder pain and function had been improved after application of an exercise program in long-time period treatment.

Limitation of the Study:

Despite of the effectiveness of proprioceptive neuromuscular facilitation pattern of upper extremity and scapula combined with conventional physiotherapy on dependent variables in this study, there were some limitations. The main limitation was the unfortunate Covid 19 pandemic situation. For this pandemic situation, researcher could not continue the research project due to the total lockdown of the country. In this study, interventions were given by clinical physiotherapists. So, the inter-rater reliability was not maintained due to lack of time and patient's availability. The other main limitation of the study was that the trial therapists could not blinded to the treatment allocation. The researcher tried to minimize the effect of unbinding by training the trial therapists. As samples were collected only from CRP- Savar, it could not represent the wider adhesive capsulitis population and the study lacks in generalize ability of results to wider population. There may another possible limitation that the training dosage or number of repetition was not sufficient and more frequent training sessions may be required. The study did not offer any follow up for participants which was essential component to find out effectiveness of treatment for longer period of time.

CHAPTER – VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Adhesive capsulitis regarded as the source of impairments within the structure of shoulder girdle region. After this study it has come out that the trial group treatment which is proprioceptive neuromuscular facilitation pattern exercise along with conventional physiotherapy is more effective to minimize pain, increase range of motion and improve functional ability than only conventional physiotherapy. In clinical practice the usual treatment for an example manual therapy, exercise therapy, electrotherapy is used frequently. After doing this study a new treatment approach is introduced to everyone which is effective and can be applicable for the benefit of the patients. Conversely, the aim and objectives of this study has been fulfilled and the null hypothesis was rejected favoring the proprioceptive neuromuscular facilitation pattern along with conventional physiotherapy for patients with adhesive capsulitis. In contrast, the techniques and procedures of proprioceptive neuromuscular facilitation pattern exercise encouraged involving patients actively as the hold-relax approach of muscle force can be progressed in accordance with patient's ability. Adhesive capsulitis affects the body system as well as the entire personnel daily activities. Since proprioceptive neuromuscular facilitation pattern exercise has been practicing by physiotherapist in limiting manner outside of this study setting, the outcomes of this study would help practitioners outside the study setting to formulate a management guideline to treat patients with adhesive capsulitis.

6.2 Recommendation

Shoulder pain in adhesive capsulitis patient is not only involve patient's body structure but also limit functional ability. So, in future studies, the International Classification of Functioning, Disability, and Health (ICF) can use to measure the outcome of the study. Besides, double-blinding is recommended for future research. For increasing the generalizability of the study, it is recommended to conduct the same study in different hospitals and communities of Bangladesh. Most of the study on shoulder pain, range of motion in adhesive capsulitis patients was conducted in chronic stage. If possible initially after affecting with adhesive capsulitis, shoulder pain prevalence and underneath pathology should be measured.

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Appendix - A

Institutional Review Board (IRB) Permission Letter

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
(The Academic Institute of CRP)
CRP-Chapain, Savar, Dhaka-1343. Tel: 02-7745464-5, 7741404 , Fax: 02-7745069

Ref: CRP-BHPI/IRB/06/2020/396

Date: 20th June 2020

To
Abid Hasan Khan
B.Sc. in Physiotherapy
Session: 2015-16, Student ID:**112150301**
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal **"Effectiveness of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy in patients with adhesive capsulitis"** by ethics committee.

Dear Abid Hasan Khan,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above mentioned dissertation, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English version)
3	Information sheet & consent form.

The purpose of the study is to find out the nature of practice of Physiotherapy in Bangladesh. The study involves use of a questionnaire to explore that may take 15 to 20 minutes to answer the specimen and there is no likelihood of any harm to the participants. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at **8.30AM on 1st March, 2020 at BHPI (23rd IRB Meeting).**

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

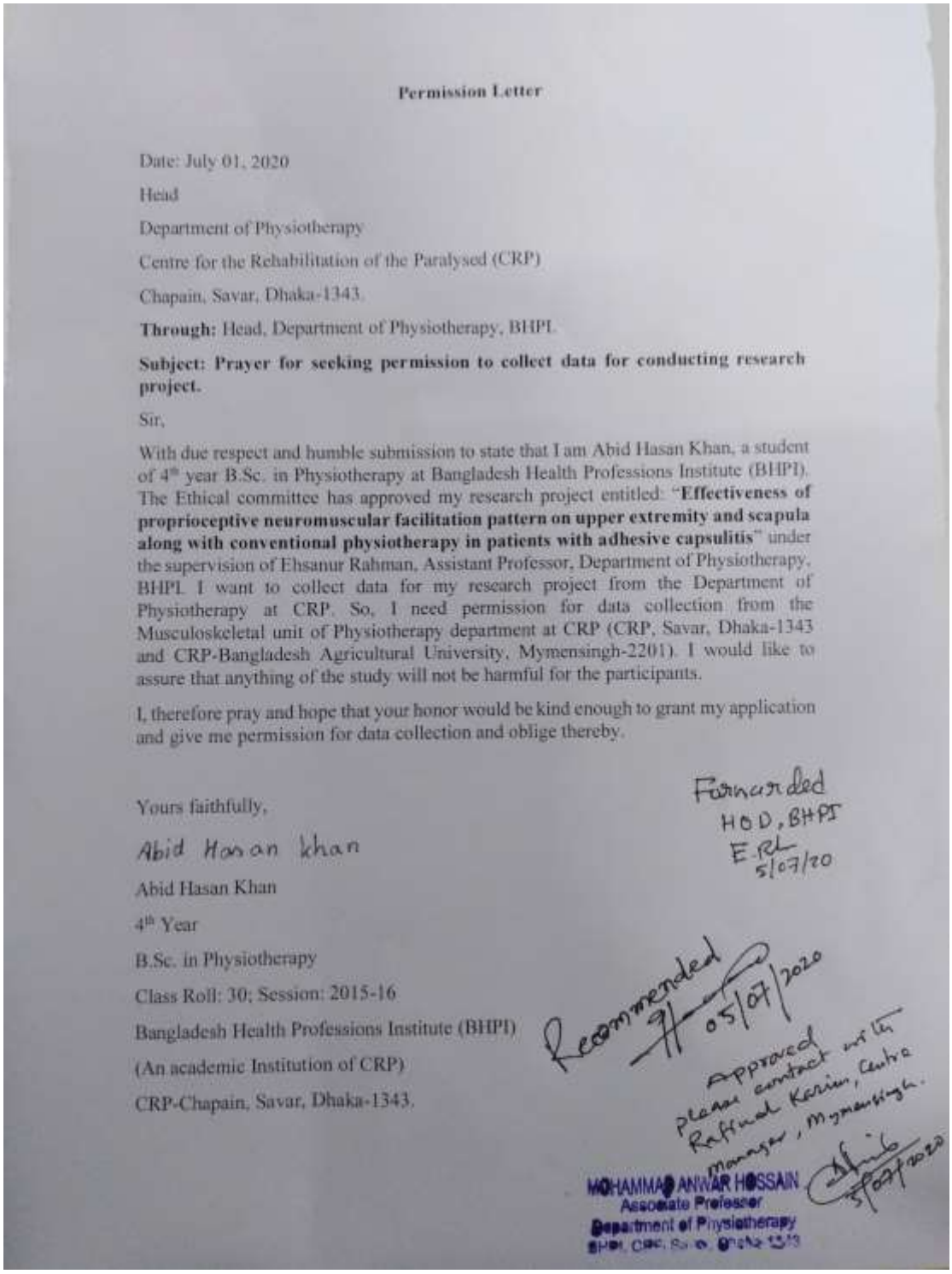
Best regards,

Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Page 1 of 1

Appendix - B

Permission letter for data collection



Permission Letter

Date: July 01, 2020

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP)

Chapain, Savar, Dhaka-1343.

Through: Head, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for conducting research project.

Sir,

With due respect and humble submission to state that I am Abid Hasan Khan, a student of 4th year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: "**Effectiveness of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy in patients with adhesive capsulitis**" under the supervision of Ehsanur Rahman, Assistant Professor, Department of Physiotherapy, BHPI. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Musculoskeletal unit of Physiotherapy department at CRP (CRP, Savar, Dhaka-1343 and CRP-Bangladesh Agricultural University, Mymensingh-2201). I would like to assure that anything of the study will not be harmful for the participants.

I, therefore pray and hope that your honor would be kind enough to grant my application and give me permission for data collection and oblige thereby.

Forwarded
HOD, BHPI
E.R.
5/07/20

Yours faithfully,

Abid Hasan Khan

Abid Hasan Khan

4th Year

B.Sc. in Physiotherapy

Class Roll: 30; Session: 2015-16

Bangladesh Health Professions Institute (BHPI)

(An academic Institution of CRP)

CRP-Chapain, Savar, Dhaka-1343.

Recommended
05/07/2020

Approved
Please contact with
Rafiqul Karim, Centre
Manager, Mymensingh.

MOHAMMAD ANWAR HOSSAIN
Associate Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343

Appendix - C

মৌখিক সম্মতিপত্র

আসসালামু আলাইকুম/ আদাব,

আমি আবিদ হাসান খান। আমি এই গবেষণা প্রকল্পটি করছি যা আমার ফিজিওথেরাপিতে স্নাতক কার্যক্রম এর অংশ। যার শিরোনাম **'অ্যাডহেসিভ ক্যাপসুলাইটিসে আক্রান্ত রোগীদের শরীরের উপরিভাগ এবং স্কেপুলার উপর প্রোপ্রিওসেপটিভ নিউরোমাসকুলার ফ্যাসিলিটেশন ধরণ পন্থার সাথে প্রচলিত ফিজিওথেরাপির কার্যকারীতা।'** এর মাধ্যমে আমি যে সকল রোগীদের অ্যাডহেসিভ ক্যাপসুলাইটিস আছে তাদের শরীরের উপরিভাগ এবং পিঠের ডানার হাড়ের উপর প্রোপ্রিওসেপটিভ নিউরোমাসকুলার ফ্যাসিলিটেশন ধরণ পন্থার প্রভাব জানতে আগ্রহী । এখন আমি আপনাকে কিছু ব্যক্তিগত, ব্যথাজনিত এবং বিকলতা বিষয়ক প্রশ্ন করবো । এতে মোটামুটি ১৫ – ২০ মিনিট লাগবে ।

আমি আপনাকে অবহিত করতে চাই যে, এটি একটি সম্পূর্ণ একাডেমিক গবেষণা এবং অন্য কোন উদ্দেশ্যের জন্য এটি ব্যবহার করা হবে না । গবেষণায় আপনার অংশগ্রহণ আপনার বর্তমান অথবা ভবিষ্যৎ চিকিৎসার উপর কোন প্রভাব ফেলবে না । আপনার প্রদত্ত সমস্ত তথ্য গোপন থাকবে এবং কোন রিপোর্ট বা প্রকাশনার ক্ষেত্রে এর উৎস গোপন থাকবে ।

এই গবেষণায় আপনার অংশগ্রহণ স্বেচ্ছাধীন এবং আপনি কোন নেতিবাচক প্রশ্ন ছাড়াই যে কোন সময় এই গবেষণা থেকে নিজেকে প্রত্তাহার করে নিতে পারবেন । আপনার অধিকার আছে কোন প্রশ্নের উত্তর না দেয়ার বা আপনার পছন্দ মত বা ইচ্ছেমত উত্তর দেয়ার।

যদি আপনার এই গবেষণা সম্পর্কে অথবা অংশগ্রহণকারী হিসেবে কিছু জানার থাকে তবে, আপনি আমার সাথে যোগাযোগ করতে পারেন অথবা আমার গবেষণা অধীক্ষক, এহসানুর রহমান, সহকারী অধ্যাপক, ফিজিওথেরাপি বিভাগ, বাংলাদেশ হেলথ প্রফেসন্স ইন্সটিটিউট (বিএইচপিআই), সিআরপি- সাভার, ঢাকা-১৩৪৩।

তাহলে এই সাক্ষাৎকারে আমি আপনার সম্মতি পেলাম ?

হ্যাঁ Δ না Δ

অংশগ্রহণকারীর স্বাক্ষর এবং তারিখ .....

সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর এবং তারিখ .....

ফিজিওথেরাপিস্টের স্বাক্ষর এবং তারিখ .....

Consent Form (English)

Assalamu Alaikum/ Adab,

I am Abid Hasan Khan; I am conducting this thesis for my B.Sc. In Physiotherapy program titled "**Effectiveness of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula along with conventional physiotherapy in patients with adhesive capsulitis.**" by this I would like to know the effect of proprioceptive neuromuscular facilitation pattern on upper extremity and scapula for patient with adhesive capsulitis. Now I want to ask some personal, pain and disability related question. This will take approximately 15-20 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. Your participation in the research will research will have no impact on your present or future treatment in the area. All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains secret.

Yours participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative questions. You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study or your right as a participant, you may contact with me and/or my research supervisor, Assistant Professor Ehsanur Rahman, Department of physiotherapy, Bangladesh Health Professions Institute (BHPI), CRP-Savar, Dhaka-1343.

So, may I have your consent to proceed with the interview?

Yes Δ No Δ

Signature and date of the Participant …….

Signature and date of the Interviewer ……

Signature and date of the Physiotherapist …….

Appendix - D

Validation of Bengali Questionnaire

Roach, Kathryn E <keroach@miami.edu> Wed, Jun 10, 7:08 PM

to me

Dear Abid Hasan Khan,

I have reviewed your back translation to English of Bengali language version of the SPADI. Your back translation corresponds very closely to the original English language SPADI suggesting that your Bengali version is a valid translation. Congratulations on your good work. Please let me know if I can be of any further assistance. Good luck with your project.

Take care, Kathy

Kathryn E. Roach, PT, PhD
Professor and Vice Chair for Research
Interim Vice Chair for PhD Studies
Department of Physical Therapy
University of Miami, Miller School of Medicine
Office 305-284-4776
Mobile 305-975-9554

Appendix - E

প্রশ্নাবলী (বাংলা)

বিভাগ – কঃ বিষয়ভিত্তিক / সামাজিক জনসংখ্যা-বিষয়ক তথ্যাবলি

এই প্রশ্নাবলী তৈরি করা হয়েছে সেসকল রোগীদের ব্যথার পরিমাণ নির্ণয় করার জন্য যাদের কাঁধের সংযোগস্থলগুলিতে অ্যাডহেসিভ ক্যাপসুলাইটিস রয়েছে এবং এই বিভাগের প্রতিটি নির্দিষ্ট অংশের বাম পাশে রোগী নিজে টিক (✓) চিহ্ন দিয়ে পূরণ করবে কিন্তু বিশেষ বিবেচনায় ফিজিওথেরাপিস্ট কালো বা নীল কলম ব্যবহার করে পূরণ করবেন ।

প্রশ্নের নম্বর	প্রশ্ন / তথ্যের বিষয়	অংশগ্রহণকারীর উত্তর	
১	বয়স	.....বছর	
২	লিঙ্গ		
৩	উচ্চতা		বিএমআই
৪	ওজন		
৫	বৈবাহিক অবস্থা	○ বিবাহিত = ১ ○ অবিবাহিত = ২ ○ তালাকপ্রাপ্ত = ৩ ○ বিধবা = ৪ ○ আলাদা বসবাস = ৫ ○ অন্যান্য = ৬	
৬	শিক্ষাগত যোগ্যতা	○ অশিক্ষিত = ১ ○ প্রাথমিক = ২ ○ এস এস সি = ৩ ○ এইছ এস সি = ৪ ○ স্নাতক = ৫ ○ মাস্টার্স = ৬ ○ স্নাতকোত্তর = ৭	
৭	পেশা	○ কৃষক = ১ ○ দিন মজুর = ২ ○ চাকুরীজীবী = ৩ ১। সরকারি ২। বেসরকারি ○ ব্যবসায়ী = ৪ ○ গার্মেন্টস শ্রমিক = ৫ ○ চালক = ৬ ○ রিকশাচালক = ৭ ○ গৃহিণী = ৮ ○ শিক্ষক = ৯ ○ বেকার = ১০	

		○ অন্যান্য = ১১
৮	জীবিকার ধরণ / কাজের ধরণ	○ বসে থেকে কাজ = ১ ○ পরিশ্রমের কাজ = ২ ○ গৃহস্থালির কাজ = ৩
৯	বসবাসের জায়গা	○ শহর = ১ ○ গ্রাম = ২ ○ উপশহর = ৩
১০	বেশিরভাগ সময় কাজ করার অবস্থা	○ বসা থেকে = ১ ○ দাঁড়িয়ে থেকে = ২ ○ হাঁটা অবস্থায় = ৩ ○ ভ্রমনের সহিত = ৪ ○ অন্যান্য (.....) = ৫
১১	○ ধূমপান = ১ ○ মদ্যপায়ী = ২	১। হ্যাঁ ২। না ১। হ্যাঁ ২। না
১২	কোন আঘাতের ঘটনা আছে? হ্যাঁ / না , যদি হ্যাঁ হয় তবে	○ সরাসরি আঘাত = ১ ○ অধিক ব্যবহার জনিত আঘাত = ২ ○ মানসিক আঘাত = ৩
১৩	আপনার দীর্ঘস্থায়ী কোন অসুখ আছে?	○ ডায়াবেটিস ম্যালাইটাস = ১ ○ উচ্চ রক্তচাপ = ২ ○ হৃদরোগ = ৩ ○ স্থূলতা = ৪ ○ অন্যান্য (উল্লেখকরুন .....) = ৫
১৪	কি ধরণের চিকিৎসা নিয়েছেন?	○ স্বাস্থ্য সম্পর্কিত চিকিৎসা = ১ ○ ফিজিওথেরাপি = ২ ○ ব্যথানাশক ঔষধ = ৩ ○ সবসময় ব্যবহৃত ঔষধ = ৪ ○ অন্যান্য = ৫

বিভাগ – খঃ ব্যথার অবস্থা

ব্যথা পরিমাপের জন্য সংখ্যাসূচক ব্যথা নির্ধারণী স্কেল

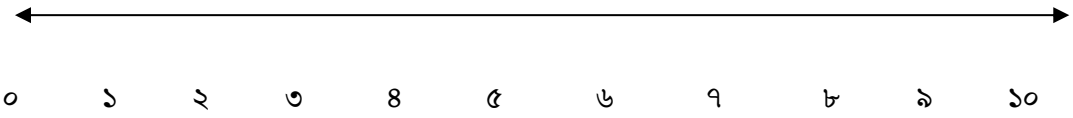
এই প্রশ্নাবলী তৈরি করা হয়েছে অ্যাডহেসিভ ক্যাপসুলাইটিস রোগীদের জন্য । ম্যাকক্ষারী (১৯৯৯), একটি সংখ্যাসূচক স্কেল ব্যবহার করেন রোগীরা কি পরিমাণ ব্যথা অনুভব করে তা পরিমাপ করার জন্য । এটা সংখ্যাসূচক ব্যথা নির্ধারণী স্কেল নামে পরিচিত । এটি ১০ সেন্টিমিটার লম্বা একটি স্কেল যাতে ০-১০ পর্যন্ত লেখা থাকে। এখানে ০ নামে কোন ব্যথা নাই, ১-৩ অল্প ব্যথাজনিত অবস্থা, ৩-৫ মাঝারি ব্যথাজনিত অবস্থা এবং ৬-১০ সবচেয়ে খারাপ অনুভূতি সম্পন্ন ব্যথার অবস্থা যা একজন রোগী অনুভব করে । প্রশ্নাবলির এই বিভাগের প্রতিটি নির্দিষ্ট অংশ রোগী নিজে কালো বা নীল কলম ব্যবহার করে পূরণ করবে ।

শূন্য (০) মানে কোন ব্যথা নাই (১-৩) মানে অল্প ব্যথা (৪-৬) মানে মাঝারি ব্যথা এবং (৭-১০) মানে তীব্র ব্যথা । যদি রোগীর কোন প্রশ্ন বুঝতে সমস্যা হয় তাহলে ফিজিওথেরাপিস্ট তাকে সে বিষয়টি বুঝিয়ে দিতে পারেন ।

আপনি কাঁধে গড়ে যে ব্যথা অনুভব করেন তা ০-১০ এর মাঝে যে সংখ্যাটির দ্বারা সবচেয়ে ভাল বর্ণনা করে তাতে গোল দাগ দিন। শূন্য (০) মানে কোন ব্যথা নাই এবং দশ (১০) মানে সবচেয়ে খারাপ অনুভূতি সম্পন্ন ব্যথা যা আপনি অনুভব করেছেন।

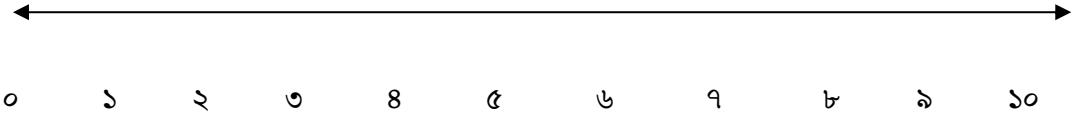
১) বিশ্রামরত অবস্থায় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পূর্বেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

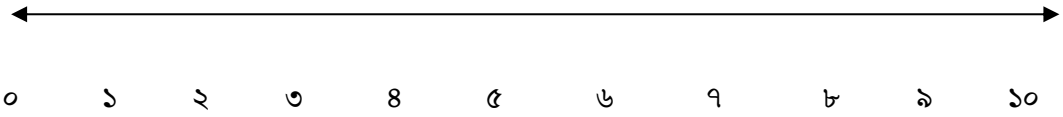
চিকিৎসার পরেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

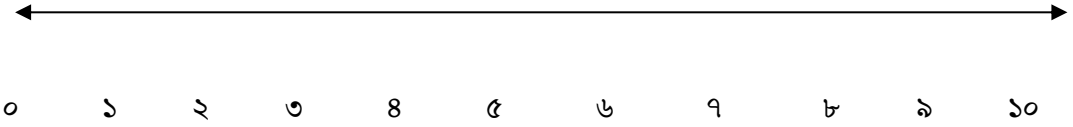
২) পাশ বরাবর হাত উপরে তোলার ক্ষেত্রে আপনি কেমন ব্যথা পান?

চিকিৎসার পূর্বেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

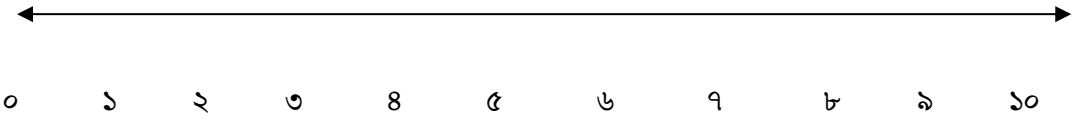
চিকিৎসার পরেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

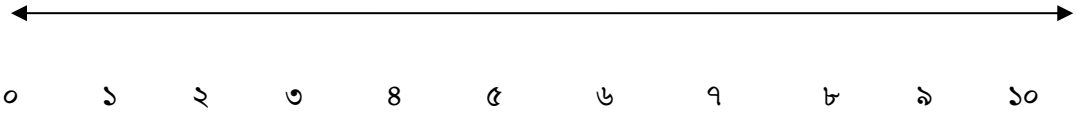
৩) চুল আঁচড়ানোর সময় আপনি কেমন ব্যথা অনুভব করেন?

চিকিৎসার পূর্বেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ



০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

বিভাগ – গঃ রেঞ্জ অব মোশন নির্ণয়

গনিওমিটার ব্যবহার করে রেঞ্জ অব মোশন নির্ণয়ঃ

১) আক্রান্ত কাঁধে নিশ্চেষ্ট এবডাকশন করা (পরীক্ষক গনিও মিটার দ্বারা পরিমাপ করবেন)

চিকিৎসার পূর্বেঃ ডিগ্রী

চিকিৎসার পরেঃ ডিগ্রী

২) আক্রান্ত কাঁধে নিশ্চেষ্ট লেটারাল রোটেশন করা (পরীক্ষক গনিও মিটার দ্বারা পরিমাপ করবেন)

চিকিৎসার পূর্বেঃ ডিগ্রী

চিকিৎসার পরেঃ ডিগ্রী

৩) আক্রান্ত কাঁধে নিশ্চেষ্ট মিডিয়াল রোটেশন করা (পরীক্ষক গনিও মিটার দ্বারা পরিমাপ করবেন)

চিকিৎসার পূর্বেঃ ডিগ্রী

চিকিৎসার পরেঃ ডিগ্রী

বিভাগ – ঘঃ স্বাভাবিক ক্রিয়ামূলক কার্যক্রমের পরিমাণ

Shoulder Pain and Disability Index (SPADI)

গত এক সপ্তাহের মধ্যে আপনার কাঁধ ব্যথা অনুভবের আলোকে নিম্নোক্ত সূচির সংশ্লিষ্ট জায়গায় উপযুক্ত নম্বর প্রদান করুন।

<u>ব্যথার হিসাব মান</u>

আপনার ব্যথার তীব্রতা কেমন?

আপনার ব্যথার প্রকৃত অবস্থা নির্দেশক প্রাপ্য মানটিকে বৃত্তাবদ্ধ করুন যেখানে ০ = কোন ব্যথা নেই এবং ১০ = অসহনীয় ব্যথা।

১) ব্যথা যখন তীব্র হয়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

২) আপনার যেদিকে ব্যথা সে পাশে কাত হয়ে শুলে ব্যথা বাড়ে?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৩) আপনি উঁচু তাকে কোন কিছুর জন্য হাত উঠালে ব্যথা লাগে?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৪) ঘাড়ের পিছনে হাত দিলে?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৫) ব্যথাযুক্ত হাত দিয়ে কোন কিছুতে ধাক্কা দিলে?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

ব্যথার মোট হিসাব মানঃ

- **চিকিৎসার পূর্বেঃ / ৫০ X ১০০ = %**
- **চিকিৎসার পরেঃ / ৫০ X ১০০ = %**

(দ্রষ্টব্যঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের মোট সংখ্যা এবং সম্ভাব্য মোট হিসাব মানের অনুপাত যেমনঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের সংখ্যা যদি ১ হয় এবং সম্ভাব্য মোট হিসাব মান ৪০, এ দুয়ের অনুপাত)

অক্ষমতার হিসাব মান

আপনার সমস্যাগুলো কেমন?

ব্যথার অনুভবের প্রকৃত অবস্থা নির্দেশক প্রাপ্ত উপযুক্ত নম্বরটিকে বৃত্তাবদ্ধ করুন যেখানে ০ = কোন সমস্যা নেই এবং ১০ = ব্যাপক সমস্যা।

১) আপনার চুল ধোয়ার সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

২) আপনার পিঠ পরিষ্কার করার সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৩) আপনি গেঞ্জি বা জাম্পার পরিধানের সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৪) সামনে বোতামওয়ালা শার্ট পরার সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৫) আপনি পায়জামা পরার সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৬) উঁচু তাকে আপনি যখন কোন কিছু রাখতে যান তখন?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৭) ১০ পাউন্ড (৪.৫ কিলোগ্রাম) ওজনের ভারী বস্তু বহনের সময়

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

৮) আপনার পিছনের পকেট থেকে কোন কিছু বের করার সময়?

চিকিৎসার পূর্বেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

চিকিৎসার পরেঃ

০ ১ ২ ৩ ৪ ৫ ৬ ৭ ৮ ৯ ১০

অক্ষমতার মোট হিসাব মানঃ

- **চিকিৎসার পূর্বেঃ / ৮০ X ১০০ = %**
- **চিকিৎসার পরেঃ / ৮০ X ১০০ = %**

(দ্রষ্টব্যঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের মোট সংখ্যা এবং সম্ভাব্য মোট হিসাব মানের অনুপাত যেমনঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের সংখ্যা যদি ১ হয় এবং সম্ভাব্য মোট হিসাব মান ৭০, এ দুয়ের অনুপাত)

সর্বমোট এসপিএডিআই স্কোরঃ

- **চিকিৎসার পূর্বেঃ / ১৩০ X ১০০ = %**
- **চিকিৎসার পরেঃ / ১৩০ X ১০০ = %**

(দ্রষ্টব্যঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের মোট সংখ্যা এবং সম্ভাব্য মোট হিসাব মানের অনুপাত যেমনঃ কোন উত্তর দাতার উত্তর না দেয়া প্রশ্নের সংখ্যা যদি ১ হয় এবং সম্ভাব্য মোট হিসাব মান ১২০, এ দুয়ের অনুপাত)

দুইটি সাবস্কেলের গড় মান গড়ে একটি সর্বমোট মান দিবে যা ০ (সব থেকে ভালো) থেকে শুরু করে ১০০ (সব থেকে খারাপ) পর্যন্ত হবে।

নূন্যতম সনাক্তযোগ্য পরিবর্তন (৯০% আস্থার সাথে) = ১৩ পয়েন্ট

(পরিবর্তন এর থেকে কম হলে একে পরিমাপ ত্রুটি বলে গণ্য করা হবে)

Questionnaire (English)

SECTION-A: Subjective/ Socio Demographic Information

This questionnaire is developed to measure the pain of the patient with adhesive capsulitis of shoulder joints and this section will be filled tick (✓) mark in the left of point by, patients but in special consideration physiotherapist using a black or blue pen.

Question Number	Questions/Information on	Response of the participant	
1	Age	……. years	
2	Sex		
3	Height		BMI
4	Weight		
5	Marital status	○ Married = 1 ○ Unmarried=2 ○ Divorced =3 ○ Widow =4 ○ Separated =5 ○ Others=6	
6	Educational status	○ Illiterate=1 ○ Primary=2 ○ SSC=3 ○ HSC=4 ○ Graduation=5 ○ Masters=6 ○ Post graduations =7	
7	Occupation	○ Farmer =1 ○ Day labor=2 ○ Service holder=3 I. Government II. Non-government ○ Businessman=4 ○ Garments worker=5 ○ Driver =6 ○ Rickshawola=7 ○ Housewife=8 ○ Teacher=9 ○ Unemployment=10 ○ Others=11	
8	Life style/ working style	○ Desk job=1 ○ Labor job=2 ○ Housekeeping=3	
9	Living area	○ Urban=1 ○ Rural=2 ○ Semi urban=3	
10	Major working position	○ Sitting=1 ○ Standing =2 ○ Walking=3 ○ Traveling=4	

		○ Other (……)
11	○ Smoking =1 ○ Alcoholic =2	1. Yes 2. No 1. Yes 2. No
12	Any history of trauma? Yes/No, if yes then	○ Direct trauma=1 ○ Over use trauma=2 ○ Psychological trauma=3
13	Do you have any chronic illness?	○ Diabetic Mellitus=1 ○ Hypertension (HTN)=2 ○ Heart disease=3 ○ Obesity=4 ○ Others (specify …….)=5
14	What type of treatments you have tried?	○ Medical treatment=1 ○ Physiotherapy=2 ○ Pain killer=3 ○ Traditional medicine=4 ○ Others =5

SECTION-B: Pain Status

Numeric Pain Rating Scale (NPRS) for pain Measurement

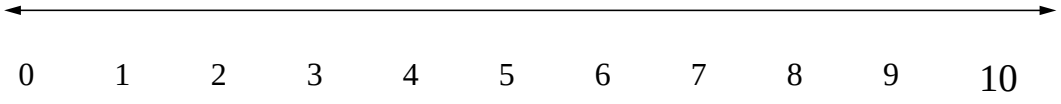
This questionnaire is designed for adhesive capsulitis patients. McCaffery et al. (1999) used a numeric scale to rate the pain status experienced by patients. It is known as Numeric Pain Rating Scale. The scale is a 10cm long scale ranging from 0-10. Here a zero (0) means no pain, 1-3 indicates mild pain, 3-5 indicates that pain is in moderate state and 6-10 is worst possible pain feeling experienced by patients. This section of questionnaire will be filled by the patient using a black or blue colored ball pen.

A Zero (0) means no pain (1-3) means mild pain (4-6) means moderate pain and (7- 10) means severe pain. If the patient struggles to understand the meaning of a question, physiotherapist is requested to clear the meaning of certain portions.

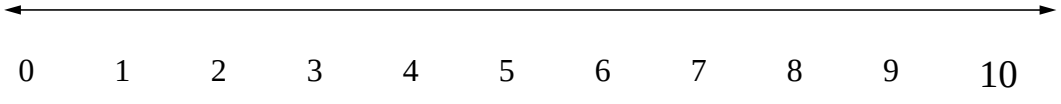
Rate the average amount of pain in your shoulder by encircling the number that best describes your pain on a scale from 0-10. A zero (0) represents no pain and a ten (10) represents worst pain you have ever experienced.

1. How severe your pain is at resting position?

Pre test

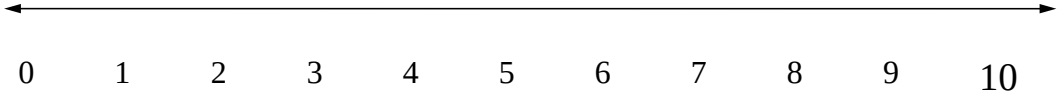


Post test

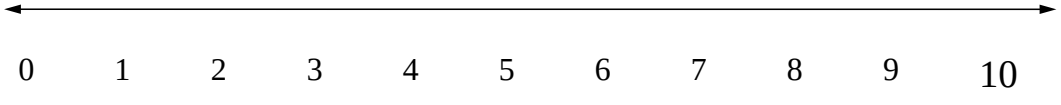


2. How severe is your pain during rising arm sideways?

Pre test



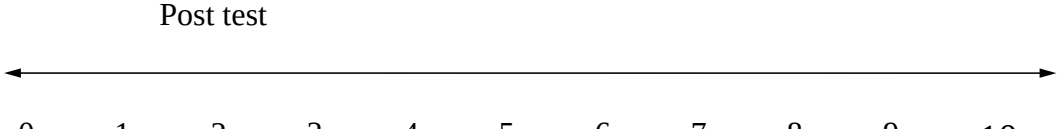
Post test



3. How severe is your pain during combing hair?

Pre test

Post test



SECTION-C: Estimate the Range of Motion

Range of Motion measured by Goniometer:

Passive ROM of Abduction of Affected Shoulder (Measured by examiner by using Goniometer).

Pre- treatment: ……Degrees

Post- treatment: ……Degrees

Passive ROM of Lateral Rotation of Affected Shoulder (Measured by examiner by using Goniometer).

Pre- treatment: ……. Degrees

Post- treatment: ……Degrees

Passive ROM of Medial Rotation of Affected Shoulder (Measured by examiner by using Goniometer).

Pre- treatment: ……. Degrees

Post- treatment: ……Degrees

SECTION-D: Estimate the Functional activities

Disability estimation by Shoulder Pain and Disability Index (SPADI)

Please place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

Pain scale
How severe is your pain?
Circle the number that best describes your pain where: 0 = no pain and 10 = the worst pain imaginable.

1. At its worst?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

2. When lying on the involved side?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

3. Reaching for something on a high shelf?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

4. Touching the back of your neck?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

5. Pushing with the involved arm?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

Total pain score:

- **Pre test:_____ /50 x 100 = %**
- **Post test:_____ /50 x 100 = %**

(Note: If a person does not answer all questions divide by the total possible score, E.g. if 1 question missed divide by 40)

Disability scale

How much difficulty do you have?
Circle the number that best describes your experience where: **0** = no difficulty and **10** = so difficult it requires help

1. Washing your hair?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

2. Washing your back?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

3. Putting on an undershirt or jumper?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

4. Putting on a shirt that buttons down the front?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

5. Putting on your pants?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

6. Placing an object on a high shelf?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

7. Carrying a heavy object of 10 pounds (4.5 kilograms)

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

8. Removing something from your back pocket?

Pre test

0 1 2 3 4 5 6 7 8 9 10

Post test

0 1 2 3 4 5 6 7 8 9 10

Total disability score:

- **Pre test: _____ / 80 x 100 = %**
- **Post test: _____ / 80 x 100 = %**

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 70)

Total SPADI score:

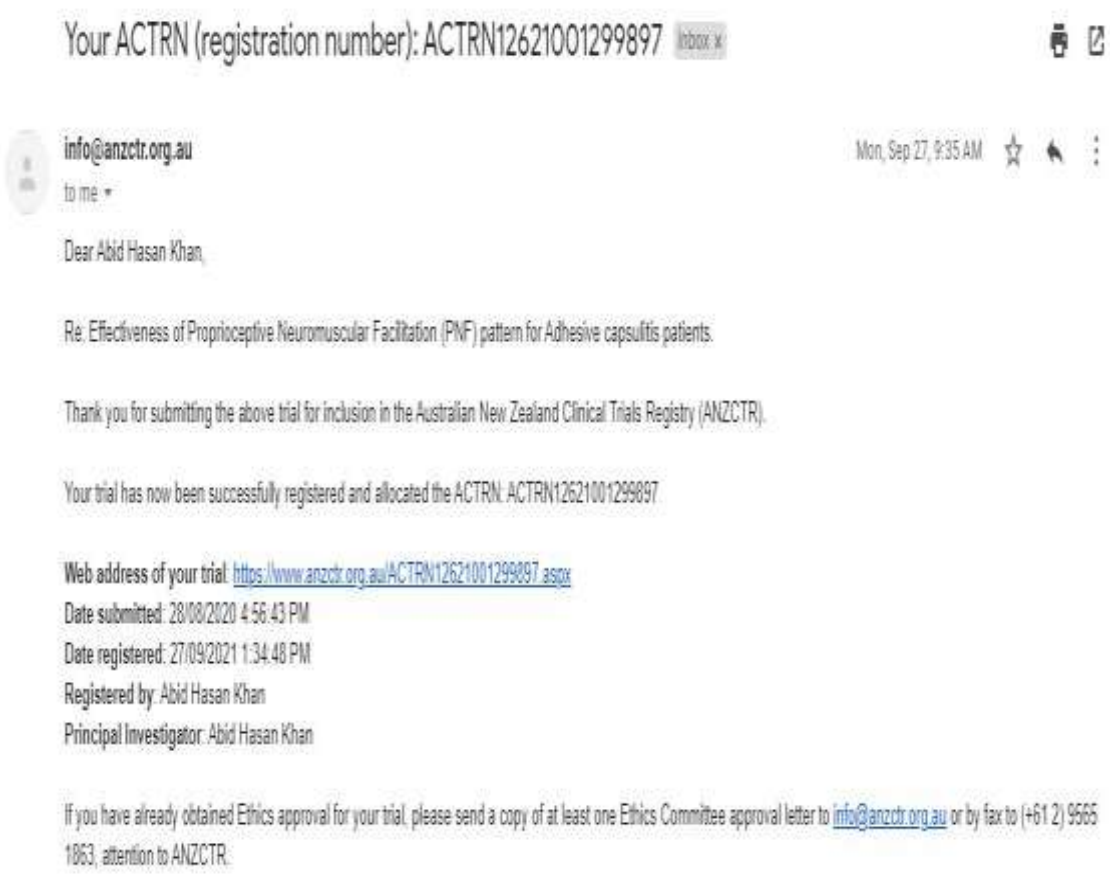
- **Pre test: _____ / 130 x 100 = %**
- **Post test: _____ / 130 x 100 = %**

(Note: If a person does not answer all questions divide by the total possible score, eg if 1 question missed divide by 120)
The means of the two subscales are averaged to produce a total score ranging from 0 (best) to 100 (worst).
Minimum Detectable Change (90% confidence) = 13 points
(Change less than this may be attributable to measurement error)

Source: Roach et al. (1991). Development of a shoulder pain and disability index

Appendix - F

WHO clinical trial registration



Your ACTRN (registration number): ACTRN12621001299897 Inbox x

info@anzctr.org.au Mon, Sep 27, 9:35 AM

to me

Dear Abid Hasan Khan,

Re: Effectiveness of Proprioceptive Neuromuscular Facilitation (PNF) pattern for Adhesive capsulitis patients.

Thank you for submitting the above trial for inclusion in the Australian New Zealand Clinical Trials Registry (ANZCTR).

Your trial has now been successfully registered and allocated the ACTRN: ACTRN12621001299897

Web address of your trial: https://www.anzctr.org.au/ACTRN12621001299897.aspx
Date submitted: 28/08/2020 4:56:43 PM
Date registered: 27/09/2021 1:34:48 PM
Registered by: Abid Hasan Khan
Principal Investigator: Abid Hasan Khan

If you have already obtained Ethics approval for your trial, please send a copy of at least one Ethics Committee approval letter to info@anzctr.org.au or by fax to (+61 2) 9565 1863, attention to ANZCTR.